Electrical Contracting

MARCH

1935

INDUSTRIAL

ELECTRICAL

MODERNIZATION

NEW ILLUMINATION VALUES

ADEQUATE WIRING WATTAGES

PRESENT WIRING CONDITIONS

A MODERNIZATION SURVEY GUIDE

HAZARDOUS AREA CLASSIFICATION

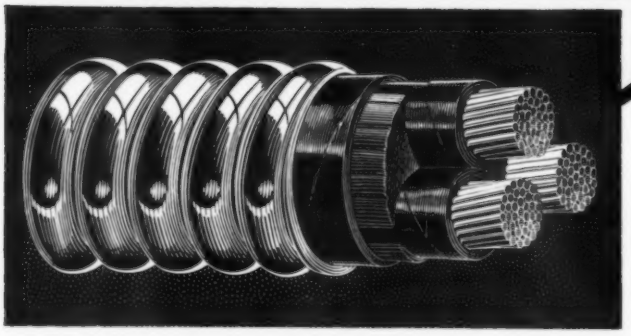
MODERN DESIGN TRENDS IN

- WIRING DEVICES
- MOTORS
- CONTROL EQUIPMENT
- FACTORY SIGNALS

CHECK LIST OF MODERN EQUIPMENT

TO MAKE SELLING EASIER

Specify



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INSULATED CABLE

ON your next big proposition tell the prospect that you would like to furnish Glyptal cloth-insulated cable for power circuits. You can then explain that he will get a first-class wiring job—a job that will last him a lifetime—and one that will in the end save him money. Glyptal will help you to sell the complete job.

WHAT THIS CABLE IS—It is much like varnished-cambric-insulated cable, except that the cloth or "cambric" is treated with Glyptal varnish instead of the standard compound.

This gives the cable superior advantages. It is tougher and more flexible. It can be safely operated at higher temperatures. It has longer life. And it is unaffected by hot oils, acids, or chemicals. The cable can be furnished with any type of finish, for installation in ducts, conduit, or directly in the earth. The type illustrated has an interlocked steel armor.

ACCEPTED BY INDUSTRIALS—Since its introduction two years ago, Glyptal cable has won widespread acceptance, particularly among large industrial users. This is especially true where service conditions are unusually severe—such as the presence of oil, acids, moisture, and high temperatures—under which ordinary cable would go to pieces. Our nearest office will gladly supply you with the names of users in your vicinity, and you and your customers can check them to see the highly satisfactory operation that Glyptal cable is giving.

You can get G-E insulated cable in every type, size, and voltage for every application. If you are in doubt as to the type to recommend for a particular job, a G-E cable specialist will help you. You can reach him through the nearest G-E distributor or G-E sales office; or address General Electric, Schenectady, N. Y.

520-40

OTHER BEST SELLERS

G-E FLOOD-LIGHTS

There are many places where you can add to your profits by selling floodlights—filling stations, construction jobs, parking fields, athletic fields, and many others.

G-E floodlights are well and widely known. The copper-bronze unit, for example, is accepted as standard by many large oil companies. It is illustrated above. Also popular, is the inexpensive open-type floodlight (AL-45), of which many thousands have been sold in the last year.

G-E TIME SWITCHES

Another profitable line for contractors is the G-E Telechron motor time switch. It will cut out expensive service calls. You do not have to wind clocks, set time, lubricate bearings, or free sticky contacts.

Installed as an integral part of any wiring job, G-E time switches often bring repeat orders and new business because of their reliability. These switches stay sold and keep selling for you.

GENERAL ELECTRIC

VOLUME 34
NUMBER 5

electrical contracting

WITH WHICH IS CONSOLIDATED THE ELECTRAGIST and ELECTRICAL RECORD

S. B. WILLIAMS, Editor F. J. SEILER, Assistant Editor
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PUBLISHED MONTHLY

BY

ELECTRICAL TRADE PUBLISHING COMPANY

HOWARD EHRLICH, PRESIDENT

NEW YORK
330 WEST 42ND ST.
MED. 3-0700

Chicago
520 North Michigan Ave.
Whitehall 7900

Cleveland
Guardian Bldg.
Main 3981

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ENTERED AS SECOND CLASS MATTER FEBRUARY 20, 1935 AT THE POST OFFICE AT NEW YORK, N. Y., UNDER THE ACT OF MARCH 3, 1879. COPYRIGHT, 1935, BY THE ELECTRICAL TRADE PUBLISHING COMPANY. YEARLY SUBSCRIPTION: UNITED STATES, $2.00; FOREIGN, $2.50; CANADA, $2.50, INCLUDING DUTY. SINGLE COPIES, 25 CENTS.

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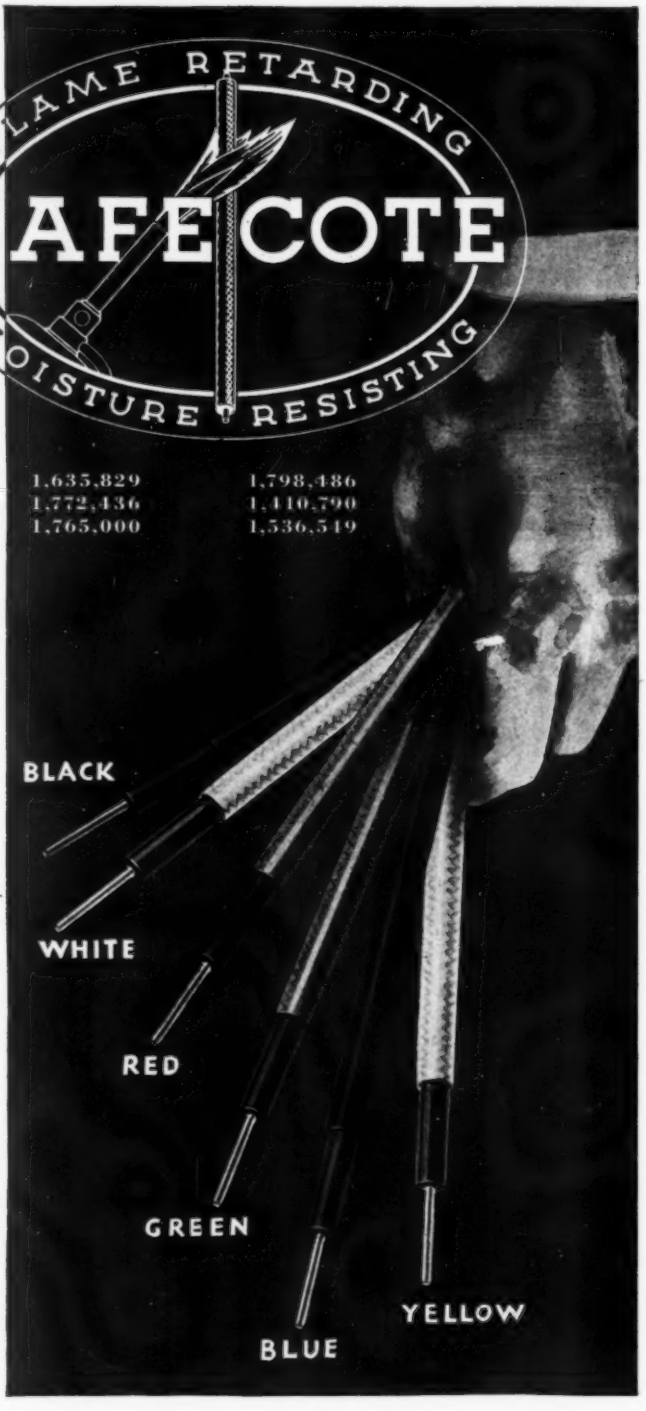

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Modernization

IN devoting this issue to the subject of industrial modernization, the publishers of ELECTRICAL CONTRACTING have attempted to coordinate the several subjects that make up electrical modernization, namely: installation, equipment and repairs.

Too often modernization has been thought of as merely the substitution of modern machinery for older types. Undoubtedly such substitution produces some benefits for the owner, but as a rule, modernization, to get the full benefits, goes much deeper than new equipment.

Unless the whole electrical layout is subjected to a searching examination, the owner in most cases will fail to receive all of the economies he is justified in expecting from modernization.

This issue, therefore, was built, not so much for the purpose of showing the need for modernization, as for the more practical purpose of showing how to secure it.

THE Plant Survey Guide is a contribution of ELECTRICAL CONTRACTING to the better achievement of industry modernization. Its use should bring about projects that give the owner the most value for his money. The suggestions and recommendations based on the facts that are secured from the use of this form will be more likely to coordinate all factors.

The illumination table tells clearly how far industry still has to go to secure lighting that gives the right vision. The values look large right now, but eyesight experts assure us that higher values will soon be common, because they will more than pay for themselves in reduced spoilage, faster operations, greater safety, less fatigue, etc.

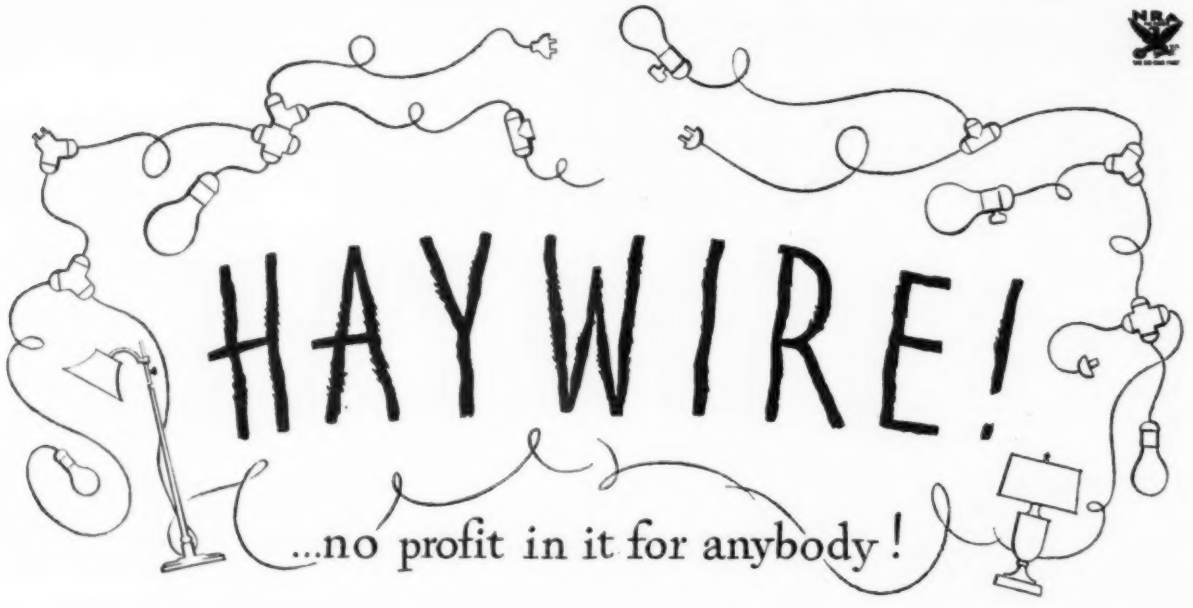
To accommodate these higher intensities, it is necessary to provide more copper. For that reason the reader will find in this issue for the first time a table of adequate wiring factors, necessary to properly serve these higher light values.

Although hazardous location rules have been in the National Electrical Code for years, and a fairly complete line of explosion-proof and dust-tight equipment has been developed by a number of manufacturers, one can find a number of people who still do not know where such locations exist. This issue, therefore, contains a fairly complete list of hazardous locations, classified as to type.

Because so many new devices have been brought out, it seemed advisable to review the trend in motors, control, alarm and signal, and in wiring devices. These reviews are positive evidence of the necessity for making alterations. The engineers of our manufacturing organizations have been very busy in the past two years or so, developing material that would better serve the modern needs of industrials.

And finally, to help our readers readily locate this modern industrial electrical equipment, we have briefed the functional points of more than fifty new devices and equipment for this purpose, and we offer our services to our readers to secure such further information as they may need about such modern products.

AND so the publishers of ELECTRICAL CONTRACTING are pleased to present this issue. Much of the material represents new information and data never before available. It is hoped that the issue will be helpful in stimulating more planned industrial electrical modernization.



Half a dozen household appliances on a single overloaded circuit. Double and triple sockets. Strange gadgets and make-shifts.

Has the Great American Home gone completely haywire?

It looks that way—in all too many cases. Contractors who have looked around know what a surprisingly large number of otherwise modern homes contain antiquated, *haywire* electrical installations.

What has happened? Who is to blame? Not the home owner. The electrical contractor? Partly, but not entirely. The big bad depression? Only partly.

Strange to say, the biggest cause of wiring inadequacy today is—*progress!* Progress has gotten ahead of home wiring.

One by one, new electrical appliances, new electrical conveniences have found their way into homes—*because people wanted them.* They are going to want more in the future. They want to keep up-to-date.

Result—the wiring installation that was ample to carry the load ten, or even five years ago, is inadequate today. The average home electrical load has grown enormously.

Never has the electrical contractor found himself face to face with a greater, more clear-cut opportunity. Reports from every side indicate the public is in more of a buying mood than at any time in years. But the public will not and can not buy wiring by itself. It must be shown —*and sold. And it's up to the electrical contractor to do the selling.*

Hint—it isn't hard to find an excuse to look at wiring in homes in your vicinity. Offer an inspection as a free service. You may be surprised to find yourself far more welcome than you expected.

Step two. Note the serious inadequacies, the inconveniences—possibly even, the electrical hazards —that may be present. Call them to the attention of the home owner. *Sell* him. But sell him convenience, comfort, safety—not just wire and outlets.

Step three. Don't stop there. *You* may know of lots of electrical improvements, new ideas, *new* conveniences and comforts. But, the chances are, your customer has never heard of them. Educate him. Bring him up to date. Tell him about built-in appliances, better lighting, future possibilities in all-year air conditioning. Tell him—and sell him!

And when you do, sell him a quality job that won't come back to reproach you later. (If you can sell a "cheap" job, you can sell a quality job.) It will pay.

To Contractors who see their opportunity, and who are ready to go out and grasp it, Graybar offers its wholehearted support. Some of that support is represented by the *dependability* of electrical materials from Graybar. Let Graybar's 66 year old reputation for quality stand behind your own business reputation.

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VOLUME 34
NUMBER 5

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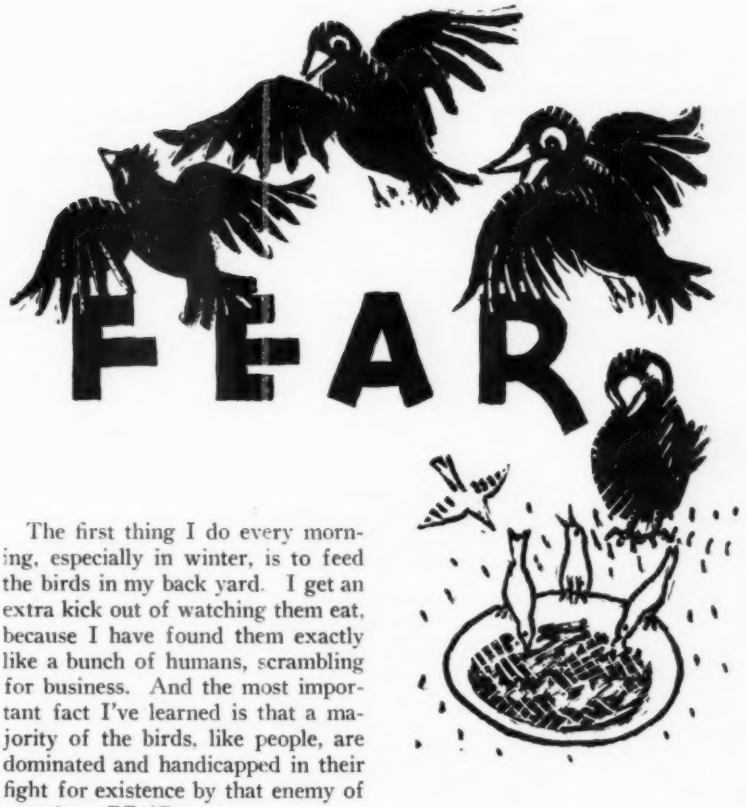


The first thing I do every morning, especially in winter, is to feed the birds in my back yard. I get an extra kick out of watching them eat, because I have found them exactly like a bunch of humans, scrambling for business. And the most important fact I've learned is that a majority of the birds, like people, are dominated and handicapped in their fight for existence by that enemy of enemies—*FEAR*.

Size or breed doesn't seem to count much, either. Take our loud-mouthed, street-fighting friend, the bluejay. He may clean up a couple of bigger fellows on his way to your dooryard and then be scared away from the food by a piece of paper, while smaller and braver souls eat their fill.

I've seen a flock of sparrows pass up a round bun because it rolled when they pecked it, but a pair of nervous little wrens fought it to a standstill. Once a blackbird stepped on the edge of a curved slice of toast; it flew up, popped him in the snoot, and he never did try again—just sat on the fence, cursing, while his gang ate it up. An albino sparrow, pure white, ate with me three months. These freaks are usually timid and much abused by normal birds, but this guy could lick them all and took his choice of the groceries.

But where fear shows up most interestingly in my feathered guests is in their suspicion of any new or different food, however tempting. Once, with about 30 birds in the yard, I put out a gob of nice, warm oatmeal. Only two wise guys would tackle it, and not until they were full as ticks did the crowd wake up and fight over the leavings. There is nothing birds like better than suet, but the first time I put out a lump, by the time the crowd decided it wouldn't burn or bite, it was safely in the bellies of a few pioneers.

The electrical contractors have had four years of winter and we're all hungry for work, but most of us are too inclined to fight for leavings instead of aiming high at larger and more special work. I don't mean for a fellow to go beyond his depth, but every contractor should check up on more profitable and artistic types of wiring, some new, some old, which he thought he couldn't handle.

I can point out, in my own bailiwick, a score of operators who did little or no industrial work a year ago, but who have boosted themselves into the black by pounding the factories. Others are getting large jobs and wondering why they were afraid of them before. Specialty wiring (air-conditioning, oil-burner, etc.), floodlighting, electric fountains, electric-eye and public address hook-ups are other things the progressives are doing, and making money, too, in spite of a still tight market.

Go after the suet—it will make your business fat.

BY JOHN WISE

Higher Lighting Intensities

now being recommended by illumination experts for industrial interiors

AS the result of studies made to discover the effect of different lighting intensities on seeing and eye fatigue, the engineering departments of the lamp companies have, within the past year, brought out new recommended intensity values which greatly exceed the former recommended values. The extent to which these values have been increased is indicated in the table on this page. No attempt has been made to show more than just a few recommendations in order to indicate what constitutes modern lighting.

Before making any recommendation, it is advisable to conduct a survey of the lighting to find out present values. These values can be greatly and easily secured by means of a small hand instrument called a sight-meter. A comparison of the values so found. when compared with the new recommended values, will quickly indicate the need for more modern lighting.

The present recommended values are proposed as averages which, if followed, will materially reduce spoilage caused by improper vision, lessen the number of accidents, accelerate the production of employees, reduce eye fatigue and thereby retard deterioration of the workers' vision.

In some states the minimum permissible lighting values are regulated by a code. Because this is a health measure there is every reason to believe that the code values will be brought up to the recommended values. This, in all probability, is waiting upon the adoption of new standards by the Illuminating Engineering Society. Such new standards are expected this year.

1935 RECOMMENDED INDUSTRIAL LIGHTING VALUES COMPARED WITH THOSE OF I.E.S. LIGHTING CODE, ADOPTED IN 1930

	Foot Candles 1935	1930
Aisles, Stairways, Passageways	2	2-3
Assembly:		
Rough	10	5-8
Medium	20	8-12
Fine	20*	12-20
Extra Fine	20*	25-100
Cloth Products:		
Cutting, Inspecting, Sewing—		
Light Goods	20	10-15
Dark Goods	20*	25-100
Pressing, Cloth Treating—		
Light Goods	10	8-12
Dark Goods	20	12-20
Dairy Products	20	8-12
Forge Shops and Welding	10	6-10
Foundries:		
Charging Floor, Tumbling, Cleaning, Pouring and Shaking Out	5	5-8
Rough Molding and Core Making	10	6-10
Fine Molding and Core Making	20	10-15
Garages—Automobile:		
Storage—Live	10	5-8
Dead	2	2-3
Repair Department and Washing	15*	10-15
Glove Manufacturing:		
Cutting, Pressing, Knitting, Sorting—		
Light Goods	10	8-12
Dark Goods	20	25-100
Stitching, Trimming and Inspecting—		
Light Goods	20	8-12
Dark Goods	20*	25-100
Store and Stock Rooms:		
Rough Bulky Material	2	2-3
Medium or Fine Material Requiring care	10	5-8

	Foot Candles 1935	1930
Cotton Mills:		
Opening and Lapping, Carding, Drawing, Roving, Dyeing	10	5-8
Spooling, Spinning, Drawing-in, Warping, Weaving, Quilling, Inspecting, Knitting, Slashing	20	8-12
Silk Mills:		
Winding, Throwing, Dyeing	15	8-12
Quilling, Warping, Weaving, Finishing—		
Light Goods	15	10-15
Dark Goods	30	15-20
Woolen Mills:		
Carding, Picking, Washing, Combing	10	4-6
Twisting, Dyeing	10	6-10
Drawing-in, Warping—		
Light Goods	15	6-10
Dark Goods	30	10-15
Weaving—		
Light Goods	15	8-12
Dark Goods	30	12-20
Knitting Machines	20	10-15
Tobacco Products:		
Drying, Stripping, General	10	2-3
Grading and Sorting	20*	15-25
Upholstering—Automobile, Coach, Furniture	20	10-15
Woodworking:		
Rough Sawing and Bench Work	10	5-8
Sizing, Planing, Rough Sanding, Medium Machine and Bench Work, Gluing, Veneering, Cooperage	20	8-12
Fine Bench and Machine Work, Fine Sanding and Finishing	30	10-15

*In addition to these general illumination values, supplemental localized lighting should be used in the order of 50 to 150 ft. candles as needed.

Industrial Plant

Adequate Wiring Standards

The table below of standard loads will give adequate circuit capacity to take care of the general overhead illumination values set up in the new tables of recommended lighting intensity values.

OUTLETS AND BRANCH CIRCUITS

GENERAL ILLUMINATION:—From the table of standard loads find the watts per sq.ft. for the given occupancy. Multiply this figure by the total area in sq.ft. of the room to be lighted, to find the total watts. The total watts divided by the number of ceiling outlets will give the watts per outlet. Layout circuits so that the load per 15-amp. circuit will not exceed 1,000 watts. If the load per outlet exceeds 1,000 watts and single-lamp fixtures are to be used, it will be necessary to make use of special high capacity circuits (mogul lamp-holder circuits).

CONVENIENCE OUTLETS:—Install at least one convenience outlet in each bay in both manufacturing and storage spaces. To supply these outlets, provide at least one branch circuit for every 1,200 sq.ft. of floor area in manufacturing spaces and for every 2,400 sq.ft. of floor area in storage spaces.

BRANCH CIRCUITS:—No wire smaller than No. 12 to be used for any branch circuit. If the single distance from the panelboard to the first outlet exceeds 50 ft., use No. 10 for this run and No. 12 between outlets.

PANELBOARDS

On each panelboard provide one spare circuit for each five circuits utilized in the initial installation.

LOADS

The feeder sizes and service capacity are to be based upon the total *Standard Load,* which is the sum of the following items:

1. The total wattage for general illumination, as computed above, plus
2. 1,000 watts for each convenience outlet circuit, plus
3. 500 watts for each spare panelboard circuit, plus
4. Any lighting or small appliance load not included in items 1, 2 and 3.

FEEDERS

No feeder conductors to be smaller than No. 8.

When carrying the standard load, the voltage drop shall not exceed 2 per cent from the service equipment to any lighting circuit panelboard.

For any standard load not exceeding 100 amp., the feeder shall be installed in a raceway large enough to contain conductors 50 per cent larger. For standard loads exceeding 100 amp., empty conduits shall be installed for additional feeders as may be needed to provide carrying capacity and not over 2 per cent voltage drop at a load equal to 150 per cent of the standard load.

In every case, any demand factor less than 100 per cent allowed by the National Electrical Code may be applied.

SERVICE

The size of the service conductors and the rating of the service switch or circuit breaker shall be at least such as will provide for a load equal to 150 per cent of the standard load, provided the standard load does not exceed 267 amp. For larger loads, special provision shall be made for future increase in the service capacity. Any demand factor less than 100 per cent allowed by the National Electrical Code may be applied.

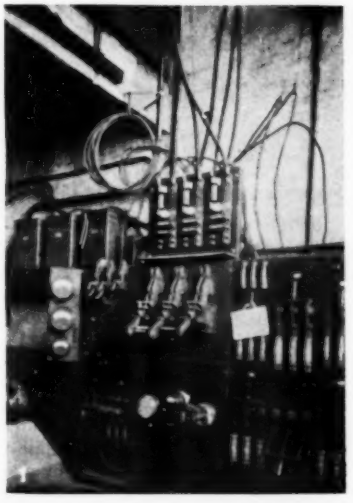
Standard Loads for General Illumination from Overhead Sources in Industrial Occupancies

Watts per sq.ft.

Aisles, stairways, passageways	1.0
Assembling:	
Rough work	1.5
Medium work	2.5
Fine work	4.0
Extra fine work*	2.0
Cloth Products—	
Cutting, Inspecting, Sewing:	
Light goods	3.0
Dark goods*	1.5
Pressing, Cloth Treating (oil cloth, etc.):	
Light goods	3.0
Dark goods	5.0
Dairy Products	2.5
Forge Shops and Welding	1.5
Foundries:	
Rough molding and core making	1.5
Fine molding and core making	3.0
Garages—Automobiles:	
Dead storage	.5
Live storage	1.5
Repair department and washing	3.0
Glove Manufacturing—	
Light Goods:	
Cutting, pressing, knitting	3.0
Sorting, stitching, trimming and inspecting	5.0
Dark Goods:	
Cutting, pressing, knitting	3.0
Sorting, stitching, trimming and inspecting*	2.0
Textile Mills—	
Cotton:	
Opening and lapping, carding, drawing-frame	1.5
Spooling, spinning, weaving, inspection	2.0
Silk:	
Light goods	3.0
Dark goods	4.0
Woolen:	
Carding, picking, washing, combing, twisting.	1.5
Drawing-in, warping and weaving—light goods	3.0
Dark goods	4.0
Knitting machines	3.0
Tobacco Products:	
Drying, stripping, general	1.0
Grading and sorting	5.0
Upholstering:	
Automobile, coach and furniture	3.0
Woodworking:	
Rough sawing and bench work	1.5
Medium	3.0
Fine	4.0

*For extra fine work, or fairly fine work on dark goods, about 2 watts per sq.ft. should be provided for general illumination, with additional provision for local illumination of 50 to 100 footcandles on the work.

No. 5—Forging Plant



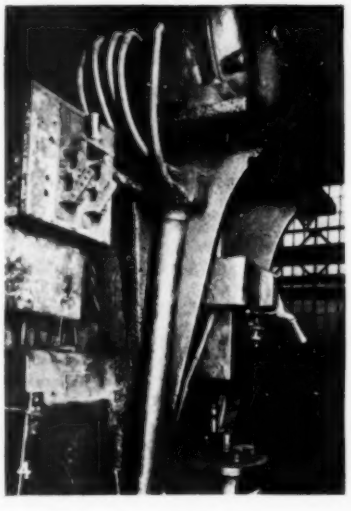
POWER requirements are usually taxed to the limit in production units employed for shaping pre-heated metals. Motor burnouts and lost time due to circuit and control apparatus failures can be avoided by modern control and protective devices, new insulation and improved locations for such equipment.

Such plants provide a wide field for modernization: Remote controlled starters, conveniently located operating stations, safety type feeder protection, grease-protected wiring methods, isolation or protection from excessive heat, removal from vibration, adequate feeder systems to meet new load values, power factor correction and the reduction of maintenance costs.

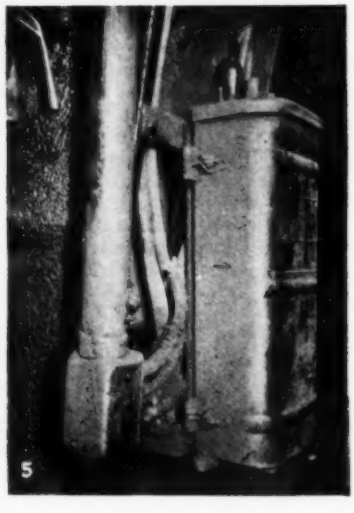
1—A 220-volt 3-phase main switchboard which had become inadequate for certain additional machinery. It was partially revamped for 440-volts and "temporary" wiring connections were made to three 25 K.V.A. 440/220 volt transformers at the left background for numerous small 220-volt motors. This modernization work has been long postponed, but its correction is now being authorized as a result of factory reinspection.

2—One of a battery of 75 h.p. motor driven upsetter forges for which automatic predetermined speed controllers will be installed on free standing frames, away from the machine. The secondary resistors will also be enclosed and removed from the vibration to which they are subjected. Controlling stations will be placed within reach of machine operators. Each machine represents a $300 control modernization job.

3—A 15 h.p. blower motor control which is being replaced with new magnetic, remote controlled apparatus.



4—A close-up of the typical 75 h.p. slip ring motor terminals. This oil soaked wiring will be replaced during the modernization of starters.



5—Oil-soaked insulation such as is crowded into the back of this 75 h.p. drum controller is highly conducive to grounds and insulation fires.

Hazardous Locations Classified

BECAUSE of the increasing number of industrial fires and explosions due to the growing use of highly flammable materials in commercial processes a new section (Article 32) on Hazardous Locations has been added within the past few years to the National Electrical Code. In this section hazardous locations are divided into four classes, the first of which deals with inflammable liquids and gases and requires explosion-proof type of equipment. The other three being of a dusty and linty nature require dust tight equipment. Wiring materials, lighting equipment, motors and control devices of both explosion proof and dust tight types have been made available within the past three or four years. To comply with the Code these devices have to pass the exacting tests of Underwriters' Laboratories.

Because of the vast number of hazardous locations and processes now being served with electrical wiring and equipment that do not afford the proper safeguards, this field offers a large opportunity for electrical modernization. The difficulty, however, has been to know what is a hazardous location. A classification of such locations, therefore, has been prepared according to kind of hazard, the definition for each class being taken from the Code. While in some cases industries are named, in other cases the notation will apply to a great many industries.

Class I

Class I locations are those in which flammable volatile liquids, highly inflammable gases, mixtures or other highly flammable substances are manufactured, used, handled, or stored in other than their original containers.

Dry Cleaning Plants
Petroleum Refineries
Bulk Oil Stations
Filling Stations
Gas Plants
Spray Painting Establishments
Dip Tank Painting Processes
Chemical Mills
Artificial Silk Factories
Pyroxylin Plastic Factories
Fabric and Paper Coating Plants
Rubber Industry
Leather and Shoe Industry
Hospitals
Soap Factories
Rotogravure Print Shops
Oil Cloth Factories
Hat Manufacturers
Distilleries
Liquor Rectifying or Blending Plants
Wall Paper Factories
Nitro-Cellulose Film Storages
Booster Stations on Oil Lines
Booster Stations on Gas Lines
Pharmaceutical Manufacturing Plants
Oil Rigs in Oil Fields
Paint and Varnish Factories
Dye and Color Manufacturing Plants
Wood Distillation Plants
Vegetable Oil Mills using Solvent Extraction Processes
Linoleum Factories
Bulk Compressed Gas Stations
Oiled Clothing Factories
Airplane Factories and Repair Shops

Class II

Class II locations are those in which (1) combustible dust is thrown, or is likely to be thrown, into suspension in the air in sufficient quantities to produce explosive mixtures or (2) those where it is impracticable to prevent such combustible dust from collecting in such quantities on or in motors, lamps, or other electrical devices that they are likely to become overheated because normal radiation is prevented.

Grain Elevators
Flour Mills
Feed Mills
Rice Mills
Corn Starch Plants
Coal Elevators
Wood Working Plants
Cork Pulverizing Plants
Sugar Refineries
Metal Dust Processes
Spice Mills
Pulverizing Plants
- Cocoa
- Sulphur
- Hard Rubber
- Dried Milk
- Soap

Breweries
Distilleries
Malting Plants
Alfalfa Mills
Wood Flour Factories
Chemical Plants (Grinding Processes)
Candy Factories (Starch Rooms)
Snuff Manufacturing Plants

Classes III and IV

Class III locations are those in which easily ignitable fibres or materials producing combustible flyings are handled, manufactured or used, and which are hazardous through such fibres or flyings collecting on or being ignited by arcing contacts, resistors, lamps or similar apparatus.

Class IV locations are those in which easily ignitable combustible fibres are stored or handled (except in rooms where in process of manufacture) and which are hazardous through such fibres being ignited by arcing contacts, resistors, lamps, or similar apparatus.

Cotton Gins
Cotton Compresses
Cotton Mills
Cotton Seed Oil Mills
Upholstery Establishments
Mattress Factories
Carpet Factories
Combustible Fibre Warehouses
Bag Factories
Rope Factories
Waste Paper Warehouses
Combustible Fibre Warehouses, storing:
- Cotton
- Sisal or Henequen
- Ixtle
- Jute
- Hemp
- Spanish Moss
- Tow
- Coco Fibre
- Oakum
- Baled Waste
- Kapok
- Excelsior

Special Service Wiring Material to Aid Modernization

MODERNIZATION of the industrial wiring system involves the application of products that will safeguard against future deterioration and corrosion, that will provide greater safety, reduced maintenance, and most efficient performance. Important improvements have been made among those products which fall into the class of wiring material. Their careful selection is of most vital importance in the replacement and repair of present industrial wiring systems.

Conduit and Raceways

Recent developments in metallic wiring raceways include several noteworthy improvements in products for industrial use. (1) Galvanized conduit threads are now treated to resist the effects of moisture and other mild corrosive agents. This eliminates possible trouble at the threaded connections of galvanized conduit systems. (2) For extremely corrosive conditions, such as chemical plants, a type of conduit has been developed which is made of a special alloy metal that successfully resists a wide range of injurious chemical agents. (3) Thin wall electrical metallic tubing has been provided with a knurled inside finish which is claimed to facilitate cable pulling. Improvements have also been made in connecting fittings. (4) For certain industrial areas requiring a density of outlets coupled with flexibility, an increased size in underfloor ducts has been developed.

Wire

The demand for better insulation to withstand injurious plant conditions and to permit greater ease in handling has resulted in improvements in several phases of insulated wire and cable manufacturing processes. (1) Flame-retarding and moisture-resisting finishes have become a Code standard. Conductors thus treated will not support combustion, and flame cannot travel along the braid. This is a curb against the spread of insulation fires which occur in junction boxes. (2) Improved types of asbestos and asbestos-varnished cambric insulations are available for wiring which is subjected to excessive temperatures, or which is massed in a large number of conductors so as to represent an insulation fire hazard. (3) A recently perfected dielectric predicts the reduction of Code insulation thicknesses at even higher insulation values than the present standards. This would permit pulling certain wire sizes into smaller conduit than the present Code standards. (4) Portable cord which possesses greater resistance to the deteriorating effects of oils, grease, gasoline and other harmful agents has been developed for motors and other portable industrial devices. (5) Special treatment of heavy feeder cable insulation has been developed that tends to snuff out combustion or smoldering that would result from failures or intense arcing. (6) Bare metal-armored ground wire has been developed. (7) Cellophane has been adapted for magnet wire insulation that permits a marked reduction in coil mass.

Conditions such as above are not unusual. The wiring for the exhaust fan has been "temporary" for years. As the operations in this plant give forth corrosive fumes, the loss of production, should the fan stop because of a wiring failure, would greatly exceed the modernization costs. This plant is an excellent example of the necessity for selecting wiring equipment adapted to severe conditions.

Fittings-Enclosures

The more general recognition of many types of explosive hazards in gaseous or dusty areas, as well as the rapid rate of corrosion in locations where acids, corrosive fumes or moistures are present, has caused the improvement of various outlet fittings and enclosures. (1) Explosion-proof fittings for hazardous locations have been improved extensively with many new types continuing to make their appearance. Such devices include enclosures for lighting units, receptacles, switches, sealing junction boxes, overcurrent devices, telephones, etc. (2) A flexible metallic explosion-proof fitting has been developed for connecting rigid conduit to explosion-proof motors, starters, etc. This simplifies explosion-proof wiring at locations where flexibility is required, or where the space is too limited to permit suitable conduit bends.

Wiring Devices

Plant maintenance costs can be sharply reduced through the introduction of improved industrial wiring devices and accessories that are designed to withstand severe use and abuse. (1) Solderless connectors and tap-off clamps have been developed for replacing old lugs that have given trouble, as well as being available with new equipment. (2) The three-light lamp has caused the development of new socket designs for separate and local pull-chain control of these variable intensities. (3) Switches have been improved to provide better protection to levers against careless blows from broom handles, etc. Guards are available for quick attachment to the plate. Improved flexible

shock-absorbing levers have been made available. Higher interrupting ratings have been designed which provide longer life under the high-current in-rushes from groups of lamps. Mercury tipping tubes have been built into tumbler mechanisms to replace air-break contacts. Compact switches may be adapted to existing concealed outlet boxes for providing additional controls. Receptacles have been improved to permit easier plugging. Flush receptacles have been developed to permit the recessing of plugs. Duplex receptacles which have separate connections are available for providing individual receptacle control or circuiting. Heavy duty outlets have been provided with improved facilities to assure the safe grounding of portable devices, and the confinement of arcing contacts. Plugs have been designed to provide better cord strain relief and easier insertion.

Trend of Modern Motor Design Toward Special Application

NO OTHER phase of industrial modernization possesses greater possibilities than the replacement of obsolete and inefficient motor drives. While the saturation point in converting engine-drive to electric power has become relatively high, the correction of earlier applications of electric motor drives has recently been made economically feasible through important refinements in motor performance and adaptability, to meet complex industrial power demands.

The individual motor is no longer regarded as a fixed unit of specific or limited performance to which industrial machinery must be adapted. Instead, we find that motors are being developed with increasingly refined classifications of torque characteristics, structural adaptability, temperature ratings, and suitability to unusual surroundings.

Ventilation

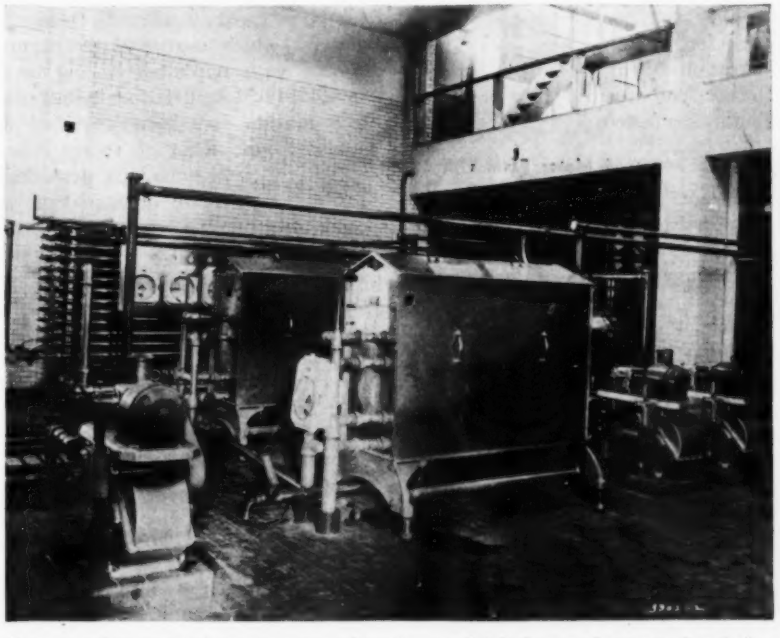
Greater isolation or confinement of motor windings within specially encased motors has been possible through the development of more effective methods of air circulation. As a result of this improvement in heat removal, it has been possible to reduce motor bulk for such types, and to greatly simplify the totally enclosed motor. The desire to protect open type motors against dirt, and dripping or splashing water, often involves makeshift housings which tend to create overheated motor conditions. Improperly ventilated motors cannot be operated safely at full load. This condition has brought about the more general adoption of splash-proof motors, totally enclosed fan-cooled motors, explosion-proof motors, open-base ventilated large motors, and rolled shell type motors, for integral mounting within machine frames.

Improved Windings

Motor burnouts often result in production losses which greatly exceed the actual cost of rewinding. Therefore a number of developments have been made available, which lessen the loss of motor windings. Improved asbestos insulation has been developed for motors which must operate under extremely high temperatures. Windings are being completely sealed to exclude harmful grease, dirt, filings, and some types of acids. Enamels and varnishes have been improved to provide a more effective protective film or coating for excluding moisture from windings, and to resist harmful acids and oil.

Unusual Surroundings

Motors have been made available which will operate more efficiently and safely under extremely injurious or hazardous surroundings. Machinery which is located in such areas may thus be individually motored for maximum flexibility. (1) Explosion-proof motors can safely be placed in the midst of highly flammable sur-



Among the special purpose applications which have characterized the trend in motor design, is the splash-proof motor. An example is shown of its use by Louis Kalischer, Inc., Brooklyn, N. Y., in a recent modernized dairy plant.

roundings such as benzol, gasoline, alcohols, lacquer, solvents, explosive dusts, etc. (2) Totally enclosed fan-cooled motors are designed to exclude harmful dirt, abrasive flyings. They may be partly exposed to the weather, or used where they might become "blanketed" with flammable flyings or sawdust accumulations. (3) Splash-proof motors permit the safe and economical operation of motors in the presence of dripping or splashing water, and where the equipment must be "hosed" down.

Mechanical Drives

The demand for reduction of space has resulted in numerous improvements for motor drive accessories. (1) Improved short-center drive apparatus includes reinforced hollow steel sheaves for V-belts. (2) Automatically adjustable motor bases are available which maintain uniform belt tensions for floor-mounted or vertical-mounted motors. (3) Speed-varying pulley attachments have been developed for V-belt drives. (4) Various types of integral gear-motor mountings have been developed to provide speed reduction over a wide ratio range. (5) Motors are being mounted upon rubber to reduce vibration and noise. (6) Close mechanical applications have been accomplished with shaftless motors, these being mounted directly upon the ends of the spindles of boring machines, woodworking machines, etc. (7) The application of multiple-disc brakes to motor end frames has been more highly perfected.

Improved Motor Frames

Motor designs have recently become standardized to such an extent that a given unit may be converted from time to time to suit its surroundings. Standard purpose convertible-type motors are available which may easily be equipped with end frames and fittings for conversion to splash-proof, dust-proof or explosion-proof service without the total removal of the principal parts. End frames have been simplified for quick removal of rotors and for general cleaning and reconditioning of bearings and stator windings. Space-saving designs have been developed by re-designing end frames to receive gear boxes, pump housings, blower shafts, etc. Ball bearings are better protected to exclude harmful dirt while the end frames are removed during coil repairs.

Circuit and Equipment Control Improvements

IMPROVED methods for controlling industrial power, lighting and heating equipment have permitted further progress in safe and dependable electrical application. Improvements in service, distribution and over-current protective equipment have resulted in further compactness, convertibility, and higher interrupting ratings.

IMPROVED CONTACTS: Recent improved types of control apparatus provide for the further elimination of blistered or pitted contacts, improved alignment, and positive tension. (1) Silver-to-silver contacts have been widely introduced as a means of reducing contact maintenance costs. (2) Arc arrestment or snuffing devices are more widely used in industrial switches, as well as mechanical improvements that will speed manual circuit breaking and closure. Devices are available for separate connection to one phase of a.c. contacts which are claimed to reduce the time duration of arcs to ½ cycle. (3) New leverage principles have been provided for large capacity manually operated devices which assure firm contact seating with minimum closing pressure. (4) More permanent fuse contact tension has been provided as standard equipment of recent types. (5) Safety type units have provisions for more positive engagement of covers and moulded sections by means of draw-in clips and catches, which also serve to cause quick pull-out circuit breaking.

OVERCURRENT PROTECTIVE DEVICES: Modern high-capacity service feeder networks represent destructive inrushes in case of plant short-circuits. These have been safeguarded against in modern high-interrupting-rating switchgear. (1) Oil circuit breakers are available with improved mechanical strength; better tanks; oil-blast; silver-to-silver contacts; improved flash barriers between phases; and greater precision in tripping devices. (2) Air circuit breakers have likewise followed similar lines of improvement, the interrupting ratings having been developed in some types to values over thirty-three times the normal load rating. (3) Persistent engineering effort has brought about a more general use of circuit breakers for service and feeder switchgear.

MORE SAFETY PROVISIONS: Life and fire hazard reduction has prompted noteworthy improvements. (1) Improved dead-front externally operable feeder and circuit control switchboards and panelboards have almost eliminated the live face types. Dead front circuit-breaker types have become universally popular and represent a modern improvement in safe industrial equipment. The recent general development of totally encased units has permitted a wide range of small ratings to be applied to the control of lighting and power branch circuits and their feeder circuits. (2) The development of a new non-flammable synthetic insulating and cooling medium for use in transformers and capacitors has decreased hazards, and in addition has permitted the marked reduction of physical dimensions and unit weights. (3) Many improved enclosure designs are available for distribution equipment that is to be used in hazardous locations. (4) Lightning protection for service and distribution equipment has become a recognized necessity. Standards have been developed for commercial application so as to lessen service interruptions and fire damages. (5) More study has been given toward simple mechanical devices for interlocking covers and operating levers to prevent accidental exposure to live contact.

FURTHER SPACE ECONOMY: The tendency to condense space for greater efficiency, and to reduce floor space requirements has resulted in continued improvements in equipment that will consume less space without reducing accessibility for wiring connections. (1) Industrial switches and panels can be spaced more closely together, in column flanges, recesses, or upon special machinery without obstructing plant operations. Such designs have also been developed to permit isolating the equipment from

mechanical injury. (2) With reduced space has come the provisions for greater ease in removing switch mechanisms from enclosures for quick maintenance or inspection. (3) The development of a synthetic cooling medium for use in transformers and capacitors has permitted marked reductions in physical dimensions.

Feeder Control Equipment

The experience gained in past years indicates a continued ever-shifting industrial plant layout which must be provided for in convertible distribution equipment. (1) Feeder panels of steel cubicle construction have undergone greater refinements in space reduction, quick interchangeability, and lessened maintenance. (2) Switchboards and feeder panelboards have been improved for greater convertibility, so as to provide standardized dimensions which would facilitate the future insertion or interchange of higher or lower rated circuit control and over-current devices. Particular attention has been given to the provisions for dependable bus contact. (3) Industrial power distribution bus bar systems have been improved to permit the quick connection of individual circuit protective devices at close centers. Time-saving shifting of individually-motored machinery has been made possible by this continued improvement. (4) The need for feeders for portable devices by which excessive lengths of cords could be eliminated has resulted in continued development and improvement in trolley feeder systems and attachments. (5) It has become necessary to limit panelboard sizes so as to prevent a likelihood of outages due to the accumulated heat radiations from large enclosed circuit groups. (6) Further lines of equipment have been announced employing safety-type, dead-front features, many employing convertible over-current rating facilities. (7) A resonant relay has been developed to be applied to throw-over panels where it is required to change from a normal to an emergency source of a.c. power if the voltage of the normal supply falls to a given percentage of its rated value. The pick-up and drop-out voltages are adjustable. (8) Recent developments permit the central supervision or dispatching of remotely located pump, valve or other motor controls.

An example of automatic remote control of a naphtha supply pump motor which was attained through the installation of a ball-lever control valve which automatically closes a control circuit when opened. This application of modern control was possible after a steam-driven pump was motorized during the modernization of a paint factory by Louis Kalischer, Inc., Brooklyn, N. Y.

Motor Control Apparatus

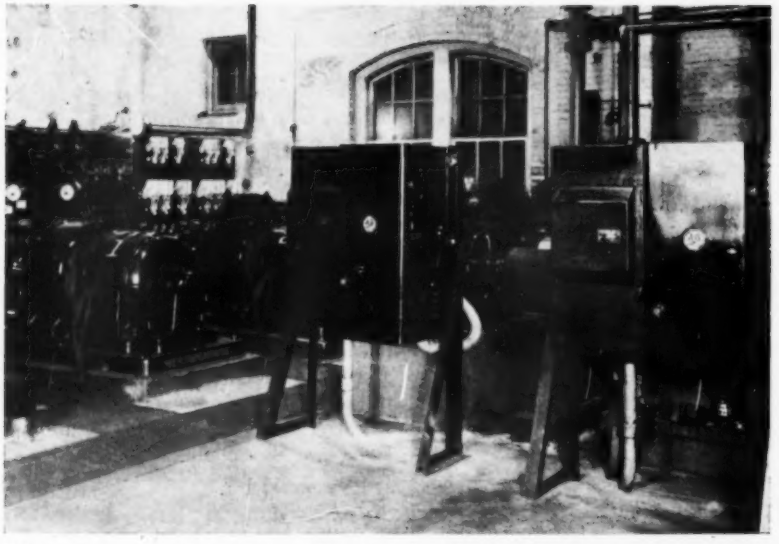
Synchronous Motor Control: Important control improvements have been made which reduce human error, provide greater flexibility through remote or automatic starting methods, and provide increased effectiveness of re-synchronization, winding protection, field excitation control, and definitely timed sequences of field application. The automatic application of reduced starting voltage is followed by transfer relay switching to line voltage after a predetermined time interval. Field excitation is automatically applied with sensitive devices which are independent of the magnitude of the induced field current or line voltage. The quick and automatic removal of field excitation for re-synchronizing out-of-step motors has been improved. Greater safety in protecting both stator and squirrel-cage windings against excessive temperatures from abnormal power factor variations, or starting conditions, has been made possible. This protection is also important in safeguarding against field excitation failure.

Capacitors: The demand for lowest possible power costs and the most efficient utilization of existing transformer or feeder equipment has caused a noticeable improvement in capacitor units for power factor correction. Recent research has permitted marked reductions in fire hazard, and in physical dimensions and weight, thus making it possible to locate such equipment at most advantageous locations with minimum structural remodeling or extensive wiring connection.

Voltage Regulators: Simplicity in design and operation of more sensitive automatic voltage regulators for a.c. and d.c. generators has been accomplished.

Magnetic Starters: A wide range of equipment has been perfected for simplifying the starting of motors by the most inexperienced operators by means of push-button stations, or for the automatic starting and stopping from remotely located auxiliary circuit-closing devices. This trend has been accompanied by complete lines of enclosures for starters and auxiliaries as well, which will resist corrosion, and which will exclude moisture, explosive fumes, gases and dust particles as the occasion may require. The tendency to apply control methods that permit the isolation of starting equipment has likewise caused the more general inclusion of such accessories as undervoltage release, and various improved types of over-current devices, the latter being principally of the thermal types. Accessibility for quick dismantling, for maintenance or inspection has been incorporated by means of many practical designs, including tank-lowering racks, flanged-out covers and easy-to-work wing nuts, completely-removable mechanism bases, etc. Devices for reduced voltage starting have been improved so as to insure more positive steps of contactor acceleration, with finer definition of time-factors. Space reduction has resulted in several makes of starters being provided with integral line switches.

Fractional Hp. Motor Control: Equipment has been condensed in several makes so as to permit the use of a compact and easily-wired magnetic device with which is en-



More convenient control and reduced maintenance costs caused these new motor controls to be installed in this brewery. Remote control synchronous motor-generator panels (at left background) replaced two old obsolete manually-operated panels. New reduced-voltage starters (in foreground) replaced two worn-out starters which were incapable of limiting the current inrush to the compressor motors. Installation by L. K. Comstock Co., New York, N. Y.

closed a small transformer. This permits low-voltage wiring to be installed to outlying control stations, such as thermostats, photronic devices, etc., while the unit itself may be placed at the most desirable position upon the driven equipment.

MANUAL CONTROLS: Maintenance and safety considerations have likewise caused further improvement in the broad field of externally-operable units, chiefly in higher speed switch closure, arc snuffing or arrestment, and interrupting ratings more nearly in proportion to the locked-rotor values of induction motors. Space has been reduced by the re-design of several makes for front-mounted operating levers. Small switches are available which are quickly removable during the wire-pulling operations, or which swing out of the way upon a hinge. Individually-housed combination switches and circuit breakers are now available in a wide range of ratings, permitting a marked degree of compactness, while also retaining high interrupting values.

Auxiliary Control Devices

CONTACT IMPROVEMENT: (1) Drum controllers for certain types of service have been re-designed for rapid closing and opening of contacts by means of sharply-pitched cams and roller-equipped contact arms. (2) The protection of inductive circuits from excessive discharge voltages, such as d.c. motor or generator fields, brakes or magnets has been improved through the development of special resistor units with characteristics that will limit peak discharges, yet which consume very low wattages during normal circuit operations. (3) A device for arresting a.c. contact arcs may be attached across one phase, and is claimed to decrease the time duration of such arcs to less than one-half cycle, as against a persistence of five to eight half-cycles without its use. (4) A low voltage electrically-held contactor for a.c. circuits up to 600 amps. has been developed which employs solid plates for the armature and the magnet, and is therefore less subject to trouble due to bulging or mushrooming from repeated hammering of switch closure than is experienced with laminated armatures and magnets. (5) Auxiliary relays for use in the presence of combustible vapor, gas or dust have been developed which employ vacuum tube-encased single-circuit contacts.

SOLENOID CONTROLS: (1) Improvements in solenoids have extended beyond the scope of limited plunger movement. Double acting moving members of unlimited stroke, also rotary motions, or motions on an arc of a circle have recently been developed. (2) Valve controls of remarkably low wattage consumption have been designed for small air, water, gas or oil flow. These devices offer quick and positive flow-stoppage and operate without hum or vibration. Coil windings have been designed for ease of removal and for maximum protection from moisture. (3) Heavy valve magnetic thrustors have been re-designed to serve other mechanical operations where positive single-stroke operations were needed. (4) Limit switches of small and compact design for installation at fixed points of travel are made available for use with control or indicating circuits.

INSTRUMENTS: (1) The testing or analyzing of industrial loads has been made more simple as the result of improved testing instruments which have been combined so as to lessen the need for a multiplicity of wire connections. (2) Improvements have been made in portable oscillographs to extend their range of application, due to convenience for use, and noteworthy advantages in operating efficiency for ease of observation. (3) The increased use of industrial X-ray equipment for the radiography of irregularly shaped castings, welds and assemblies has resulted in improvements for greater safety, mobility and flexibility in angulation. Oil-filled and shock-proof tube mountings and transformers, as well as shock-proof cables have been developed.

PHOTRONIC - ELECTRON DEVICES: (1) The setting-up of control functions from minute current or voltage impulses as brief as 1/5000 of a second has been developed by means of a line of ultra high speed electronic control devices, or lock-in controllers. (2) A timer has been developed which measures out a pre-set length of time and closes or opens its contacts for that time after the initiating impulse has been given from a push button, foot treadle, or cam operated switch. The time may be adjusted within a range from 1/10 second to 45 seconds. (3) Photoelectric relays have been improved for general industrial use so as to withstand relatively higher interrupting service. Their enclosures have been made compact and sturdy to meet general protective requirements in severe usage.

New Opportunities for Signaling Devices

THE "nervous system" of industry has become an ever-increasing maze of equipment with which inter-communications may be carried on, to sound or indicate warnings, to issue widespread calls for busy department heads, to direct operations at remote points, or to quickly block or clear busy arteries of industrial production flow.

Communicating Systems

A wider choice of limited-station inter-phone systems has been made available for use in the smaller industries that have heretofore operated without such facilities.

The automatic systems, for use in larger plants, have undergone steady improvement to provide speedy and independent station-to-station or outside calling, yet with more rugged equipment that will reduce specialized maintenance. Such equipment offers many advantages for replacing existing systems of limited functions or station capacity.

Paging Devices

The public address system may be applied to varied important uses in office-to-plant orders, calls, etc. Recent improvements tend to make such equipment more efficient and more compact. Electrical features, such as return-call signaling facilities, improved microphones, amplifying units, and speaker equipment have been developed.

The central control of coded calling impulses has kept pace with other means of signaling. Small compact devices may now be had which are easily adjustable for calling large variations of codes over outlying bell or chime systems.

Annunciators-Pilots

The annunciator has not been as widely adapted to industrial uses as its potential value would warrant. There are many plant conditions which may be more accurately kept under supervision with such devices, such as the periods of occupancy or use of certain spaces, or the indication of when important isolated production units are in-operative. The development of mercury tube contacts, relays, thermostatic devices, etc., make it more simple to provide dependable control circuits for drop or lamp-type central boards at superintendents' stations or isolated offices. Electrical resets may be applied for various combinations. Automatic relays are available which permit the operation of auxiliary audible signals for extended periods of time, after a drop has functioned, so as to direct attention to accumulated warnings or signals from several stations.

Audible Signals

Bells and gongs have been redesigned for ease of installation and of maintenance. Horns have been equipped with accessible adjustment screws so that it is no longer necessary to dismantle them in order to make future adjustments. Improved types of air signals are available, including self-contained types which do not require an air piping connection. These employ an integral motor-driven compressor which delivers loud signals at relatively rapid paging impulses. Improved designs in small solenoid-operated air valves permit use of handy air lines for loud automatic or remote-manually-controlled air signals.

Fire Alarms

Fire detecting devices have been developed for operating electrical alarms, which are based on the rate-of-rise principle of control. Sudden temperature changes of definite magnitudes will cause the closing of electrical contacts for sounding alarms. Some are adjustable as to temperature limits. Improvements in such equipment include designs which may be screwed into lamp sockets, and which contain integral audible signal devices. Certain types employ thermally-tipped mercury tubes for sealing the electrical contacts from corrosion and dirt accumulations. Conventional sprinkler-head fire detector designs have been adapted to use in electrical contact closing, such units being designed for installation upon standard outlet boxes, and may be distributed over areas in a manner similar to that which would be installed for wet or dry-piped sprinkler-alarm systems. Individual or common electrical circuits may be run therefrom to departmental alarms, annunciators or general alarm devices.

Foremen who must work in the midst of noisy plants need loud signals at their stations to supplement indicating lamps. This modernization job includes a larger house phone bell, a red pilot, and a combination bell and pilot on wall which operates on the maximum demand warning system in conjunction with the superintendent's station. Installation by S. J. O'Brien, Inc., New York, N. Y.

A Check List of Modern

Industrial Electrical Equipment

Recent developments offer better efficiency, improved safety, reduced shut down, space saving, lower maintenance, thereby presenting many opportunities for industrial modernization.

1. Space-Saving Capacitor

Cramped quarters may safely be assigned for accommodating large power capacitors which have recently been developed for power factor correction use.

2. Convertible Circuit Breaker

Circuit requirements may vary during plant changes, therefore a recent development in circuit breakers permits the individual unit cases to be replaced as required.

3. Plunger Signal Devices

Low maintenance and current costs are claimed for a recent development in code calling bells and chimes in which the only moving part is a solenoid operated plunger.

4. Roomy Fittings

Threaded fittings for large conduits are available which provide long openings and covers to facilitate the pulling or splicing of heavy cables at locations where pull boxes are objectionable.

5. Automatic Belt Tension

Belt tensions for motor drives are automatically kept uniform, regulated for expansion, under light or heavy loads, through the use of a recent adjustable base development. This device can be used for flat or vertical drive.

6. Temperature Alarm

An alarm, which operates from a light socket, sounds automatically if a room temperature rise of from 15 to 20 deg. F. per minute occurs. It functions just as rapidly whether temperature is 10 deg. below zero or 100 deg. above.

7. Safe Portable Tool Plug

The accidental breaking of high cycle tool circuits and the danger of shocks from ground currents has been minimized in a line of polarized receptacles, plugs and housings for industrial use.

8. 6-Station Telephone

Six outlying inter-phones may be used for talking to one master station, or they may be interconnected through the master station. This is a private phone system designed for dry cell operation.

9. Vibration Proof Terminal

It is no longer necessary to install soldered lugs when making cable tap-offs or at wire or cable terminals. A solderless terminal has been developed which, it is claimed, can be quickly connected to various sizes of feeder cables so as to provide permanent vibration-proof contact.

10. Hurt-Proof Oil Breaker

An oil circuit breaker is now available which is claimed to safeguard against flashovers, blistered contacts, tank explosions, and heavy short-circuit current inrushes due to its high closing speed, improved phase barriers, arcing contacts, tank linings and supports.

11. 12-Combination Push Button

Twelve different control hook-ups are obtainable, with a new two-circuit momentary contact push button without the introduction of additional parts or mechanisms. These hook-ups may be used for the remote control of motors, signals, alarms or lights. Also two circuits may be operated simultaneously, individually or in mechanically interlocked sequences.

12. Cast Iron Safety Switch

A line of cast iron-enclosure switches is available which provides protection against dust or weather, quick make and quick break facilities and which is interlocked against being opened to live switch exposure.

13. Non-Leak Flexible Conduit

For excessively damp, gaseous or explosive areas where the use of rigid conduit is not feasible due to extremely difficult or limited bends, or vibrations, a flexible conduit has been developed that withstands vibration, water pressure and 500 lbs. hydrostatic pressure.

14. Time-Delay Fuse

Renewable fuses are available which only blow if current overloads are sustained for dangerous periods, and which avoid needless blowout during harmless momentary overloads.

15. Adjustable Contact Timer

Circuits may be left "on" or "off" for adjustable periods of time ranging from $\frac{1}{10}$ to 45 seconds with an improved grid-glow tube device.

16. Time-Lag Circuit Breaker

Small motors and heaters won't become disconnected during normal momentary overloads when controlled by a compact switch and time-lag circuit breaker that is available.

17. Non-Stop Brush Seater

Machines need not be shut down while seating carbon, graphite or metal-composition brushes, if an insulating abrasive material which has been developed for this purpose is used.

18. Plunger-Push

A dial is set and a plunger is pushed down for making any one of 30 separate codes to call 30 different people over any kind of signal or any kind of current.

19. Space-Saving Explosion Proof Breaker

Crowded spaces around machinery may have explosion-proof circuit breaker controls up to 600 amp. at handy recessed places or in closely banked groups. A line of cast iron enclosed breakers has been especially designed for this.

20. Angle Plug

Tight spaces between equipment and wall receptacles do not prevent the insertion of extra-shallow angle type attachment plugs which are now available.

21. Oil Protected Cord

Oil and acid conditions will not shorten the life of portable cords nearly so rapidly if provided with an improved compound-treated covering that has recently come on the market.

22. Motor Winding Dielectric

A line of magnet wire is now available with insulation that is claimed to reduce the required coil space to two-thirds of that required for double cotton covered wire.

23. Easy Reflector Cleaning

No ladder hazards or lamp breakage risks are entailed with an improved line of self-aligning reflector fittings that permit the easy lowering of large pole-mounted outdoor floodlighting reflectors for regular cleaning and relamping.

24. Easy Pulling Wire

Requiring less space in conduits, yet claimed to offer higher standard insulation qualities, an improved insulated wire offers easier installation in those hard-to-pull replacement jobs.

25. Larger Lamp Guard Hooks

Small pipes, nails or wires are not necessary for placing an improved line

of hook handle lamp guards at "just the right spot." It can be hooked on large pipes, bench tops, between joints and other handy places.

26. Safety Heavy Duty Breaker

Safety in air circuit breakers has been extended beyond normal operation in a recently improved compact design. This line is claimed to interrupt loads over 33 times the maximum normal.

27. Forced Draft Heater

Out-of-the-way places can be heated with even temperature and receive all the benefit from element radiations with a line of fan-equipped heavy duty heaters recently announced.

28. Winding Protection

Believing that motor windings are worth protecting against metallic dust, oil, etc., a line of motors has been announced for which the manufacturer has sealed the stator coils with a hard smooth shield.

29. Curb Switching Hazards

Solenoid operated motor starting switches may be used with safety in various hazardous places where explosive dusts, vapors, fumes or gases are present. A recent improvement in enclosures permits one type of solenoid operated switch to be uniformly applied for motors in various hazardous areas.

30. Plant Efficiency Tests

It is not necessary to guess about motor overloads, underloads, power factor or starting inrushes. Such conditions can be quickly and accurately analyzed by using an improved instrument assembly that is now available for a wide range of loads.

31. Arc-Quenching Plugs

Heavy circuit breaking or closing arcs remain confined within the combustion chamber of a rugged type of industrial receptacles and plugs until their strength has become dissipated.

32. Easy-to-Clean Fixture

Globe cleaning has been simplified so as to give higher efficiencies for lighting units located in dusty or fume-laden areas, such as chemical plants, distilleries, breweries, etc.

33. Dirt-Proof Alarm Contact

Positive fire alarm circuit contact is claimed, despite corrosive, oily or dusty surroundings, for a temperature operated fire detecting device that is available. The contacts are closed within a sealed mercury tipping tube.

34. Small Get-at-Able Switch

Just swing the switch mechanism out of the way while making up conduit bushings, and while pulling and splicing wires within the enclosure of a recently announced line of small motor switches.

35. Switch for Crowded Spaces

An improved type of compact small motor switch may be used in close quarters since the toggle operating lever is front operated, thus reducing side clearance spaces.

36. Simpler Bell Mountings

Bells and gongs are now available which permit the wiring connections to be made to a separate back plate without hindrance from the device itself. The bell or gong is merely hung on and pushed in place in one final operation.

37. Durable Contact Switch

Rapid circuit contact due to frictionless switch blade pivots is claimed to eliminate wear from arcs and burns in a small safety switch which has recently been announced.

38. Light-Weight Panelboard

A line of externally operated circuit breaker panelboards has been developed for use in Class II, Group G locations that make light weight enclosures possible.

39. Heat Resisting Windings

Motors may be re-wound to render lasting protection against excessive temperatures by employing improved types of asbestos magnet wire which are available in several distinct finishes.

40. Tumbler Switch Guard

A guard which protects flush tumbler switch levers against blows and abuse is now available for quick attachment to the existing plate.

41. Fatigueless Light

Eye fatigue may be reduced, shadows eliminated, and high intensities secured from high-ceiling-mounted reflectors with a recent development in lamps for industrial use.

42. Small Solenoid Valve

Only two moving parts are employed in an easily installed low current-consuming valve which is available for remote control of water, gas, oil or low pressure steam. The coil may be changed without removing the valve from pipe line.

43. Trouble-Free Starters

Contact cleaning and dressing is claimed to be ended, while back-of-panel wiring has been eliminated in an improved solenoid type across-the-line motor starter. Seven types of enclosures are available.

44. Trolley Feeders

Small motors or portable tools may be moved along assembly lines in safe, uninterrupted electrical contact without lost plug-in time or extension cord handling by means of recently improved trolley feeder systems.

45. Fixed Rating Thermal Units

Overload relay tampering is thwarted when an improved a.c. manual push button starter is used which employs a melting alloy and ratchet wheel thermal overload protective device. It is claimed this device cannot get out of adjustment.

46. Heavy Switches for Close Quarters

The width of an improved line of type A switches has been reduced so as to permit their being recessed in limited spaces such as between the flanges of columns, in corners, or between pipes.

47. Plug-In Distribution

The locations of motors may be changed during brief plant shut-downs and quickly restored in safe permanent service by means of improved bus distribution systems which permit the quick and safe plugging-in of motor circuits at almost any desired locations along the full length of the bus system.

48. Lasting Conduit Supports

Conduit must be kept supported as long as it remains usable, therefore supporting clips and hangers are now available in a special corrosion-resistive metal for use where strong corrosive acids, vapors or gases are present.

49. Protected Transformer

The terminals are enclosed in separate metal compartments so as to permit continuous conduit-to-case protection for the primary and secondary leads of small power air-cooled transformers which have recently been announced.

50. Sealed Socket Bodies

Sockets, with sealed-in mechanisms to resist foreign particles and to prevent tampering, have also been encased in an insulating material which provides rigid support for reflector fittings.

51. Switch for Heavy In-Rush

Flush switches have been designed which are capable of switching heavy type "C" lamp loads. Binding screws have been made ample so as to accommodate larger circuit conductors.

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electrical contracting

With which is consolidated Electrical Record

S. B. WILLIAMS, Editor

READY FOR A PROGRAM

THE Executive Committee of the National Electrical Contractors Association met last month in Chicago for the first time in nearly a year. As was to be expected, the committee had much to occupy its attention in the way of reports of officers and committees, budget and finances, and similar strictly administrative matters requiring its approval.

With the decks thus cleared the committee is in a position to give attention to the formulation of a definite and balanced program of Association activities. The financial position of the Association is the best it has been in years, while the membership is the largest it has ever been. The Association therefore, is in a better position than it ever was to carry out a program successfully.

For the past two years the efforts of the Association have been bent almost entirely, first to securing a code of fair competition, and then as sponsor for the Code to placing all its facilities at the disposition of the Code Authority in order that the Code might accomplish as much as possible in the shortest period of time. When one considers what has been accomplished in the administration of the Code, it becomes apparent how well the N.E.C.A. can organize its industry for a program.

The Code is now functioning, and other work can now be carried on. There are many pressing economic problems of today, and there are many more that we know will come with improving business.

Cooperative market development activities of many kinds are now under consideration in the electrical industry. How can the contractors best fit into such plans? Some of these plans will call for lower wiring costs. An intelligent answer must be given. Methods that jeopardize the contractor's place in house wiring are gaining ground. Are they sound? Production methods have made it possible for contractors in some cities to enter new fields. Can this type of business be made to spread? During the depression many mechanics have died, gone into other occupations, lost their skill, etc. What effect will this have on the contractor as building picks up? What is being done to prepare for it?

These are only a few of the things that are calling for study. It is an opportunity for the Association, and it is extremely fortunate that the N.E.C.A. is in such a good financial position just when its efforts are most needed.

TRADE EXTENSION

ONE of the most encouraging pieces of news that has been received for some time is the announcement that N.E.M.A. is about to undertake a study of trade extension activities. Always in the past an engineering body with its work, outside of the code of fair competition, relating largely to the development of standards, it is refreshing to find the manufacturers association thinking of ways to develop markets—create business.

Commercial leadership is needed to stimulate the electrical industry to business expansion. The power companies have supplied in the past what little has been done, with the exception of a few product movements. However, because the power companies are local, there is no incentive for doing things together in a standard manner. The manufacturers, on the other hand, being national, have a different perspective and should lead in such programs.

There is much that can be accomplished by creative selling. The way out of the depression is trade extension. The report of the N.E.M.A. committee will be awaited with considerable interest.

MODERNIZATION SURVEY GUIDE

THERE is presented with this issue a check list to be used in making a survey of an industrial plant prior to making recommendations for modernization or other alterations. While this guide is probably far from being complete, it is offered to the industry as the first of its kind for general use. If it has merit, perhaps some national organization will build upon it, and bring out a standard form which will be more nearly complete.

Until such a standard form is available, we recommend the use of the form in this issue. Its

use will prevent many items from escaping the surveyor's attention. Moreover, by using this form, an orderly method of making surveys will result and the recommendations can therefore be more inclusive.

The survey form will be found to proceed first with wiring, then take up equipment, and conclude with repairs. This perhaps is different from the procedure generally followed. We have done this purposely in order to insure the proper attention to the wiring. Modernization is only partly an equipment problem. The wiring itself is often more in need of modernizing than the equipment. Frequently much of the equipment now in use would function very satisfactorily if the wiring were ample, safe and flexible.

The thought in our mind when preparing this form was to consider the present installation in a plant from these standpoints: Was it reliable? Would it carry the load and do the necessary operations efficiently? Was it safe? Could it be changed in any way that would improve efficiency and plant operation, reduce maintenance and lost production, and lower costs?

THE TEST

ALMOST everything that the electrical industry has tried to undertake, through the cooperation of its several branches, has failed. The one notable exception so far has been the National Electrical Code. Is it too about to succumb?

Petty jealousies, over reaching ambitions of low-visioned individuals, commercial intrigue, association pride—these are the shoals of human foible upon which cooperation within the electrical industry has been wrecked. Are we going to permit one of these rocks to tear apart the vessel which has carried our wiring practice to a point where it is better than any other in the whole world?

The National Electrical Code dates back to 1882, when the insurance people, in cooperation with the Edison Electric Light Company of New York, the first central station in the country then in operation but a few weeks, promulgated a brief set of rules.

Step by step we have progressed, changing the rules, adding new ones—always in step with the rapidly advancing art, letting experience of men in the field be the guide, and always with an eye to improved installations, safety and good operation.

Now come a group of electric light and power company men who would destroy the Code—the Bible of the industry. These men are frank. They want a code that will enable cheaper forms of wiring to secure acceptance easily.

The National Electrical Code has withstood the attack of commercialism before, but this attack, if successful, will so shatter confidence in the code that its value will be destroyed.

The proposal of this power company group—and while they represent the Edison Electric Institute, there is no reason to believe that they are at all representative of the thinking of the power industry—is that the Code be reduced to a few pages of general principles, appended to which, but not a part thereof, shall be a recommended guide to good practice.

Everyone who understands the Code and has the best interests of the electrical industry at heart, agrees that the Code would be greatly improved by rewriting it, leaving out manufacturing standards and other extraneous material, and bringing related matter together. Here opinion splits, for while the power group would reduce the Code to a small set of general principles, the students of Code operation would amplify it by greater detail and definition.

There is no question but what some better method for introducing a new type of material to the electrical market is necessary. There have been several unfortunate examples of commercial interests attempting to use the Code to block competition. A plan should be devised whereby that situation can never again occur.

Surely these problems can be worked out without destroying the Code.

Because this matter is so serious, we trust that the Electrical Committee, N. F. P. A., which is meeting this month for the biennial revision of the Code, will not just let the matter lie over for another two years while a committee brings a report. This Electrical Committee has a responsibility which it must accept.

Let us accept those parts of the power group's suggestions as have real merit and find some way to make them practical—let the emasculation of the Code be rejected.

One thing is obvious—unless the local industry is convinced of the integrity of the National Electrical Code, it will deny the Code and set up its own rules. Moreover, there is every reason to believe that such local rules will be much more restrictive as to materials and methods than the present Code.

Is this what the industry wants—different rules in each city, lack of standardization, restriction? Is the Electrical Committee, N. F. P. A., willing to take the responsibility for such a situation?

Is the power industry itself willing to face these inevitable results of its program in order to gain the doubtful advantage of cheaper wiring systems as yet unborn?

\\\ code chats ///

A MONTHLY DISCUSSION OF WIRING PRACTICE AND QUESTIONS OF INTERPRETATION, PRESENTED WITH A VIEW TOWARD ENCOURAGING A BETTER UNDERSTANDING OF THE NATIONAL ELECTRICAL CODE

CONDUCTED BY F. N. M. SQUIRES
CHIEF INSPECTOR, N. Y. BOARD OF FIRE UNDERWRITERS

MEANS FOR FASTENING SURFACE EXTENSIONS

Rule 516-g states that non-metallic surface extensions shall be secured to the surface wired over by approved means. What would be considered approved means?

The first part of this rule states that it should be secured every 6 in., then further it states there should be at least one such fastening between all outlets. Which paragraph shall we go by?

The manufacturer devises the method of securing the material to the surface wired over and this scheme is approved by Underwriters' Laboratories as part of the approval of the material. This method must then be followed.

Information relative to this is supplied by the manufacturer and by the Laboratories.

Both paragraphs should be followed.

CUTOUTS IN BATHROOMS

I have installed cutout cabinets over the bath tubs (with showers) in the bathrooms of an apartment house and have received a violation notice on them from the inspector. Is the inspector right?

If these cutouts are installed in ordinary pressed steel cutout cabinets the inspector is right, as rule 806-h requires that when fuses are installed in locations exposed to moisture they shall be in cabinets approved for the conditions.

Bathrooms, and especially those having showers, are certainly exposed to moisture and are no fit place for the installation of fuses. If, however, there is no other location for the fuses than a bathroom, then the cabinet should be of the approved vaporproof type.

It appears that in the example cited that the last sentence of rule 806-h may have been violated also, as the location of fuses over a bath tub is not generally readily accessible.

Send Your Questions

This section is conducted regularly for the benefit of the readers of ELECTRICAL CONTRACTING. Mr. Squires will be glad to answer any questions pertaining to the National Electrical Code rules. Send your questions to Editor, ELECTRICAL CONTRACTING, 330 West 42nd Street, New York, N. Y.

CABLE ARMOR FOR GROUNDING

Under 908-k, could the armor of a 1-wire armored cable be used for grounding the service conduit?

No. Rule 908-f requires that it be a wire, or rigid conduit, or steel pipe, and 908-l specifies the size of such a grounding conductor. It can readily be realized that the spiral armor of armored cable or flexible conduit has not the conductivity necessary.

CUTOUT ENCLOSURES

How do you interpret the last sentence of rule 702-h: "Wiring spaces that are required by rule g (having wiring gutters for over four circuits) and which are exposed when doors are open, shall be provided with covers to complete the enclosure."

This means that where a cutout box in which there are wiring gutters has a cover which, when open, exposes the entire interior of the box, there must be a separate or auxiliary cover over the gutter which will keep the gutter covered when the cutout box cover is open.

GROUNDING OF LIGHTNING ARRESTERS

Is it permissible to use the system grounding conductor taken off the supply side of the service switch as a protective (lightning) grounding conductor also?

Rule 907-g specifically states that "lightning arresters on a secondary distribution system may be grounded at the service entrance on the grounded conductor of the distribution circuit," which, of course, is required elsewhere in the Code to be grounded. Hence the system grounding conductor may also be used for protective grounding.

NON-METALLIC SHEATHED CABLE FOR SERVICES

Does the Code prohibit the use of non-metallic sheathed cable for service entrance conductors? If so, please state the reference in the Code.

Rule 404-g requires that overhead service conductors enter a building in rigid conduit, electrical metallic tubing, service entrance cable approved for the purpose, or as separate individual wires.

Non-metallic cable could be used in the first two mentioned cases, but would not be permitted to be used as service entrance cable, nor to be opened up and used as the separate individual wires.

For underground service entrance conductors, the non-metallic sheathed cable would not meet the requirements of rule 404-d, in that it is

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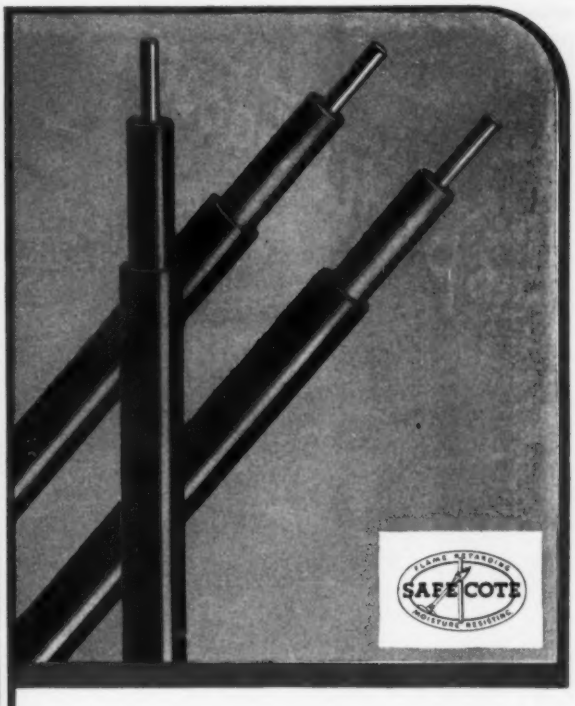

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The color of the rubber insulation on G-E Building Wires immediately identifies the grade. (Code-black — Intermediate-red — 30%-green.) Eight different colored braids facilitate circuit testing. Conductors are accurately centered for uniform and adequate insulation. G-E Rubber-insulated Leaded Cables are skillfully manufactured to facilitate installation.

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neither lead covered nor "approved for the purpose."

Of course, some of the service entrance cables are not metallic sheathed, but this does not list them as "non-metallic sheathed cables" nor does it mean that "non-metallic sheathed cables" as such, can be used for service entrance work.

NON-METALLIC SURFACE EXTENSION BENDS

Rule 516-h states that angle bends in runs of non-metallic surface extensions which reduce the normal spacing between conductors of the assembly shall be covered with an approved cap.

1. Are these angle bends considered a 90 deg. bend only?

No, not 90 deg. bends only, but also any bend which reduces the normal distance between conductors.

2. As I interpret this rule it is not compulsory to use the angle bends. Is this correct?

If the manufacturer of the surface extension material can supply an angle device or fitting angle bends of the material can be avoided.

3. If angle bends are required, must they be used for internal and external bends?

As internal or external bends are flat bends rather than angle bends and, therefore, do not reduce the normal spacings between conductors no fitting is required.

CORRECTION

In the February issue an error occurred in the answer to the question relative to "Size of Grounding Conductor."

The first paragraph of our answer should have read "When No. 8 service wires are used the wire used for grounding the neutral should be not smaller than No. 8 to satisfy rule 908-b."

Of course, 908-c does not permit the use of conduit (unless of brass or copper in a single length) as the grounding conductor for a system neutral.

As for a common grounding conductor, rule 908-h requires that one be at least No. 4 if run open. But in the case referred to the service conduit being 3-in. requires a No. 0 grounding wire, and as this is larger than No. 4 it would not have to be run in conduit or armor.

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CODE AUTHORITY NEWS

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THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION SPONSORS THE CODE OF FAIR COMPETITION FOR THE ELECTRICAL CONTRACTING INDUSTRY

CODE AUTHORITY HOLDS TWO-DAY MEETING

A meeting of the Code Authority for the Electrical Construction Industry was held in Chicago on February 13, 14 and 15. Coming right after the meeting of the Executive Committee, N.E.C.A., it gave both bodies an opportunity to confer informally on several matters of mutual interest. One afternoon was given up to an open forum session, open to all members of the industry and attended by a number of local administrative committee members from the surrounding areas.

The meetings of the Code Authority were largely devoted to matters of financial policy, details of administration, review of L.A.C. activities and rulings relating to some debatable Code questions.

It was reported that the collection of assessments was improving monthly and that considerable progress was being made in the collection of delinquent accounts.

Although a large number of L.A.C. budgets had been presented, no further progress had been made toward securing an increase in L.A.C. assessments.

A compilation of nearly one thousand business statements showing actual overhead has been filed with the Administration, and repeated efforts have been made to secure some information on the status of the cost finding method, minimum overhead and estimating methods, but no further progress was reported. It was voted to continue efforts to secure the L.A.C. assessment increase as well as a cost finding method, minimum overhead and estimating method.

It was voted not to approve a resolution putting central bid depositories under the Construction Code Authority, reserving the right to approve or disapprove of a contract depository in specific cases and for specific areas after determining the desire of those in the areas.

The Code Authority took recognition of the activities of certain L.A.C.s where the Code was being used to the selfish advantage of members of the committees and authorized the chairman to send a note of warning to all L.A.C.s.

At the open forum the Code Authority attempted to answer through its chairman or executive officer, a large number of questions. The question most frequently asked related to taking up new bids prior to the elapse of 90 days; uninvited bidders; single bidders; time and material bidding; bid depository practice; authority of Code over those not within the industry.

The Code Authority ruled that where the bidding had been competitive (i.e., more than one bidder) the taking of bids prior to the elapse of 90 days, where there had been no substantial change in the project, constituted a violation of the Code and that members of the industry would be violators if they submitted new bids. It was ruled that it was immaterial in what form the new bids were asked, or how many were asked to bid the second time. In this same connection it was also ruled that after the bidding was closed one could not submit a bid on a different pricing method.

Where there is but one bidder it was held that no competition exists and the rules do not apply.

The rules apply equally well to time and material as to lump sum bids. All bidders, however, must be given an equal opportunity to bid.

The Code Authority can administer only its own code and review only the acts of the members of its own industry. It has no authority over other members of the construction industry who might be Code violators. It can, however, warn members of its own industry that they will become violators if they enter into negotiations with others who are violating the Code.

LOSES BLUE EAGLE

The NRA Compliance Council on January 28 found that the Wendt Electric Company of Wilmington, Del., was paying electrical help less than the minimum wages. The respondent was given the opportunity to adjust the case by giving a certificate of compliance and agreement to make full restitution of back wages. When no signed certificate and agreement were received, the council voted to recommend that the respondent be deprived of the Blue Eagle and the case referred to the litigation division.

COMPLAINT RECORD

The report of the Code Authority on complaints for the period between October 28, 1934, and February 15, 1935, show 265 complaints on hand, and 1,353 new complaints. These were disposed of as follows: Rejected without investigation, 31; adjusted, 952; investigated but no violations found, 184; referred to NRA, 87; number on hand but not referred to NRA, 364.

Thus out of 3,200 complaints received since the Code started, only 11

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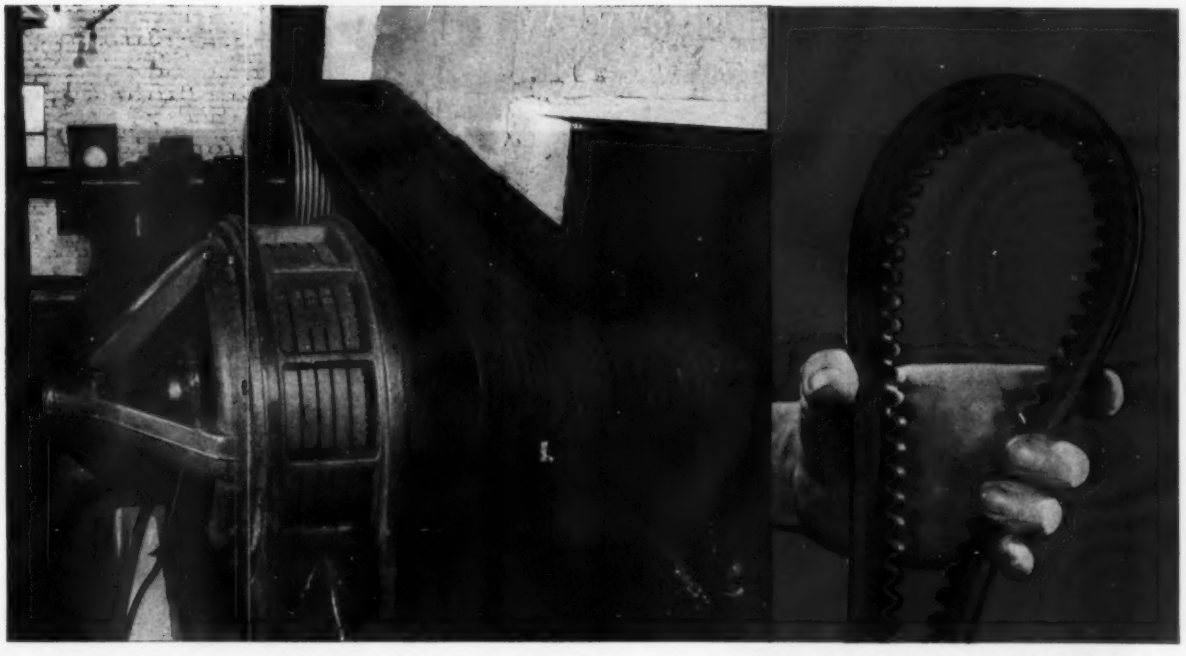

The only V-Belt that is specifically Built-to-Bend. The scientific construction of these belts makes possible the amazing performance of Dayton Cog-Belt Drives

The installation of Dayton V-Belt Drives has enabled plant and production managers to solve many troublesome and unusual power transmission problems. In addition, savings amounting to thousands of dollars a year have been effected.

A striking example of savings that can be effected is found in a coal mine Ventilating Fan Installation. The original drive had a center distance of 25 feet. The edges of the belt were being constantly torn by rubbing on the wall of the building. This drive was replaced with a Dayton Cog-Belt Drive with a center distance of only 10 feet. This change not only saved belts and space but it also eliminated the constant danger of drive failure. The Dayton Cog-Belt Drive was found to be in perfect condition after a long period of continuous running.

Similar savings have been made in plants of all kinds where Dayton V-Belts have been installed. Here are some of the reasons why: Dayton V-Belts are "built-to-bend." Their exclusive and patented construction makes them more flexible. They are die-cut, not molded, and accurately fit the grooves of all standard pulleys. Their rigid crosswise construction prevents distortion—there is no slipping or weaving. This means smoother running . . . positive speed . . . less tension . . . less wear on bearings. Machines last longer and there's practically no maintenance cost.

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Simplicity . . . .

3
SIMPLE
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The Keynote of the Success of ELECTRUNITE Steeltubes

REG. U. S. PATENT OFFICE

Perhaps the most important reason why more than 60,000,000 feet of Electrunite Steeltubes has been installed in the comparatively short time it has been available is its simplicity and ease of installation. There are no threads to fit or cut. Three simple compression-type fittings—coupling, box connector and adapter for connecting to standard threaded conduit fittings—make tight joints and adapt this modern threadless rigid conduit to any type of installation.

ELECTRICALLY · WELDED ·

Its light weight, ease of handling, strong, rigid, electric weld construction, and its ease in bending also contribute materially to the simplicity of Electrunite Steeltubes. And by no means of ordinary importance is its knurled inside finish—not smooth like in ordinary conduit, but with thousands of tiny, rounded knobs that act like ball bearings and make wire pulling approximately 35% easier.

Electrunite Steeltubes provides adequate electrical and mechanical protection. It resists corrosion. It is approved by Underwriters' Laboratories, The National Electrical Code and the U. S. Government. And with all these advantages, the surprising fact is that Electrunite Steeltubes, with all the necessary couplings and box connectors, costs less to buy than ordinary threaded conduit.

Contractors who use Electrunite Steeltubes say that it is the easiest-wiring conduit on the market. If you haven't as yet had an opportunity to prove for yourself the profit it makes possible, even on closely competitive work, it will pay you to try it on your next job. We'll gladly send a sample, if you wish.

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Knurled inside finish available in ½", ¾" and 1" sizes

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GREENLEE Conduit BENDERS ARE MONEY SAVERS

Greenlee Hydraulic Conduit Benders are money savers on any job where conduit is to be bent. And it doesn't make any difference if the job is that of wiring a new building, modernizing an old one, or taking care of maintenance work in an industrial plant.

The point is, if conduit is to be bent, a Greenlee will do it better and save money. We make this statement because so many users have told us so and have mentioned so many cases where one has paid for itself on the first job.

There are many reasons why this is true of Greenlee Benders, but they can all be summed up in the statement that they bend conduit faster and better than by any other method; that they eliminate the need for many costly fittings; and that they make it easier to pull in wire and cable.

We want you to know more about the improved benders shown here and how they will save money for you. Just use the handy coupon. No obligation, of course.

Bending rigid conduit with a Greenlee. These Benders are convenient to operate and require very little effort, even for bending the larger sizes.

Greenlee Rigid Conduit Bender. Built in two sizes for bending from 1¼" to 3" conduit and from 2½" to 4½" conduit.

Greenlee Conduit Bender with attachments for bending thin-wall steel conduit in sizes from 1¼" to 2".

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per cent are still on hand, and less than a third of them have been on hand more than six weeks.

The provision most frequently violated is that referring to the filing of bids.

STATISTICS BEING COLLECTED

The Construction Code Authority is now questionnairing 150,000 members of the industry as to the amount of employment and its distribution according to types of projects and the volume of construction as of January, 1934, and January, 1935. It is expected that the information so secured will be useful to the Federal Government in determining the allocation of the $4,880,000,000 P.W.A. bill now before congress.

The code authority states that not only will the reports be kept confidential, but in no case will a report be used for code compliance purposes.

Expands Business Interests: With the purchase of an established local motor repair shop to supplement a general wiring business, E. C. Carlson of the Carlson Electric Co., Youngstown, Ohio, has a complete service for all classes of customers. Since February, 1934, an engineer has been employed to specialize in commercial air-conditioning, which has resulted in sales in several nearby cities. In addition, Mr. Carlson is interested in a branch contracting business in a nearby city, which is operated on a limited basis, patterned after their Youngstown small job service department, which is claimed to have proven satisfactory for doing such work efficiently. While large jobs are scarce the careful handling of small work has permitted this program of expansion to be undertaken. Mr. Carlson is chairman of the Youngstown electrical contractors' L.A.C.

FORM C 121

SCHEDULE SHEET

DEPARTMENT *Stamping* DATE *3-5-1935*

Part Number	Quantity	Raw Materials	Work Completed
28-151	6,000	20 gauge Copper-Bearing Steel	4,160
29-601	10,000	32 gauge 18+8 Stainless	1,123
7-708	5,000	18 gauge Cold Rolled	5,000
8-607	1,000	16 gauge Copper	603
18-116	5,000	16 gauge Copper	5,000
20-115	10,000	32 gauge Cold Rolled	2,160
19-172	6,000	18 gauge Hot Rolled Annealed	5,106
27-151	5,000	32 gauge 18+8 Stainless	5,000
31-161	10,000	18 gauge Hot Rolled Annealed	3,132

Show Customers how to Modernize and Eliminate STOPPED Time in their Plants

The secret of Jefferson Super-Lag performance is in the lag plate on the Super-Lag link. This plate delays the normal fuse action, provides a time interval or lag by absorbing temporary heat rise. This time-lag prevents the fuse from blowing on harmless temporary overloads —saves needless STOPPED time and link replacements.

Modern Jefferson Super-Lag Fuses eliminate "stopped" time, idle motors and machines—because they do not blow the moment current rises—do not stop the motor if the overload is only temporary. But they operate positively before the overload has time to become dangerous. It is this "wait" which gives the motor a chance to recover speed—which eliminates needless STOPPED TIME.

Modernize Your Fuse Equipment

Use today's time-saving fuses for all your electrical equipment—and stop wasted "time outs." Jefferson Renewable Super-Lag Fuses are made in all capacities —knife blade and ferrule contact types.

Fuse Chart—FREE—A handy guide to selection of proper size fuses at a glance, for the adequate protection of motors. Ask for Fuse Chart No. 18.

JEFFERSON ELECTRIC COMPANY
BELLWOOD (Suburb of Chicago) ILLINOIS
Canadian Factory: 535 College Street, Toronto

JEFFERSON Super-Lag RENEWABLE FUSES

CONTRACTING news

INFORMATION OF INTEREST TO ELECTRICAL CONTRACTORS CONSISTING OF ITEMS OF NEWS, SHORT ARTICLES, PRACTICAL IDEAS, ETC., OUR READERS ARE INVITED TO CONTRIBUTE TO THIS DEPARTMENT

N.E.M.A. TO STUDY TRADE EXTENSION

A comprehensive committee, representing every section of N.E.M.A. is being organized to study trade extension work and bring in a report of possible market development activities, and recommendations of type and scope of action.

I. B. E. W. DRAFTS MODEL ORDINANCE

A specimen draft of a model municipal electrical ordinance to govern the sale and installation of electrical work, the reinspection of existing wiring, and the licensing of contractors and workmen has recently been released by the research department of the I.B.E.W.

In this draft eleven wiring methods are approved, namely, standard rigid steel conduit, metal underfloor raceway, underplaster extensions, flexible steel conduit, armored cable, armored cable lead sheathed, surface metal raceways, bare bus-bars and risers, wireways and busways, auxiliary gutters, knob and tube. These methods are then classified as to use for specific types of building construction and certain locations in structures, such as basements, hazardous locations, exposure to atmospheric, corrosive or mechanically injurious condition.

This draft also includes a sales control section under which it would be unlawful to sell, or display for sale, any electrical material, device or appliance which does not comply with the provisions of the proposed ordinance. Reinspections of existing wiring must be made periodically, the ordinance providing authority for the inspector to order corrections.

MAYER RECEIVES McGRAW CONTRACTOR AWARD

The James H. McGraw Award for the most outstanding contribution to the progress of the electrical construction industry in 1934 was presented on February 13 to L. E. Mayer at a banquet at the Stevens Hotel, Chicago, in joint honor of the Executive Committee, N.E.C.A., and the Electrical Contractors Code Authority. The presentation was made by Howard Ehrlich, vice-president, McGraw-Hill Publishing Company.

With J. A. Fowler, Memphis, Tenn., acting as toastmaster, addresses were heard from Quinn O'Brien, corporation counsel of Chicago; D. W. Tracey, administration member, NRA, and president, International Brotherhood of Electrical Workers; W. A. Jackson, commissioner of gas and electricity of Chicago; F. R. Eiseman, chairman executive committee, National Electrical Wholesalers Association and Keith Carlin, regional attorney, NRA.

On the Award Committee were Clyde L. Chamblin, J. A. Fowler, G. M. Sanborn, all past presidents, N.E.C.A.; Earl N. Peak, vice-president of the Association, and D. B. Clayton, for many years a member of its Executive Committee.

The citation accompanying the award, reads as follows:

Leo E. Mayer, president of the White City Electric Company of Chicago, was president of the National Electrical Contractors Association when at the beginning of the depression building ceased in the United States and the business of electrical

Banquet in honor of Code Authority and N.E.C.A. Executive Committee

MODERN

BUILT TO THE FAMOUS STANDARD OF CUTLER-HAMMER MOTOR CONTROL

YOUR OPPORTUNITY

If you had your choice, wouldn't you rather ride a new streamline train, the newest low wing plane, or air flow car? It's human nature to want the latest . . . and the man who supplies a *modern* safety switch marks his job as better . . . makes an impression that gets more business.

Alert contractors will cash in on the appeal of this modern Cutler-Hammer (Bul. 4140) Safety Switch. It has every desired feature. Suitable for entrance switch requirements in many sections. Ideal for oil burners, domestic stokers, air compressors, unit heaters, dairies, laundries, ice plants, stores, etc.

This small switch offers an unusual opportunity. Carried by independent electrical wholesalers everywhere. Feature it now. Send for literature. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Avenue, Milwaukee, Wisc.

CUTLER-HAMMER

SAFETY SWITCHES

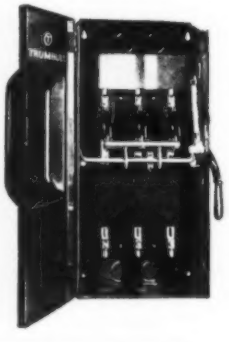
C-H

Bul. 4140H2—Type D—30 ampere—positive Make and Break. Plenty of knockouts located near back *edges* to permit direct running of conduit. Not only customary ample wiring space but mechanism completely removable to permit unobstructed pulling of wires.

The TRUMBULL

The Trumbull line has been designed by industrial experts for economy of operation, efficient service and long life, safety and trouble free performance.

It is nationally distributed by wholesalers of unquestioned repute.



1

TYPE "A"

Heavy-duty Industrial Switches built for hard service.

30-2400 ampere.

Fuse and hinge jaws sweated and pinned into footblocks.

Trumbull Type "A" Switches, open and enclosed types, have been leaders for thirty years.

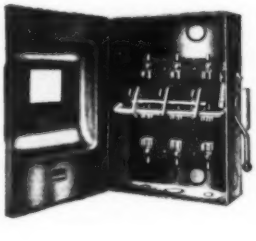
2

"RB"

Heavy-duty Industrial Switches of high interrupting capacity.

30-800 ampere.

Fusible switches equipped with "Vystipe" Clamps instead of fuse clips—an insurance against expense, inconvenience and danger from fuse contact heating.



3

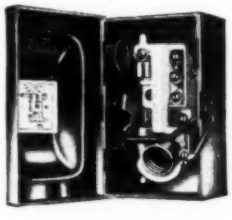
TYPE "C"

Intermediate-duty Industrial Switches.

30 and 60 ampere—bent-up fuse clips.

100 and 200 ampere—fuse and hinge jaws riveted to footblocks.

These sturdy switches are unique in their class.



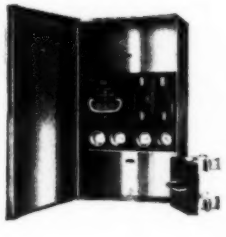
4

TYPE "D"

Light-duty and Entrance Switches 30-400 ampere.

Particularly adapted for lighting and branch circuit disconnects and small motor installations such as oil burners.

This line is designed to meet price requirements on switches where frequent or severe operation is not demanded.



5

No. 2924

A very popular combination Range and Entrance Switch.

60 ampere main and range switches of the pull-out type—easily installed.

Approved as service equipment.

Solderless connectors on main and range terminals.

We also furnish this type with one 60 ampere Switch—with and without branch circuits.

6

39,000 LINE

Meter Service Switches.

With or without fusible range switch and branch circuit cutouts.

New sequence S-M-F.

Accessible or sealable main fuses.

With testing facilities.

We manufacture a complete line of Meter Service Switches for all requirements.

MODERNIZATION CHECK LIST

7

"RB" TUMBLER

Heavy-duty Switches.

Without overload protection, for Motor Starting or for use on lighting circuits.

2 hp., 250-500 v., A.C.

Made in 2 pole, 3 pole, 4 pole, 3-way.

One of the industry's best sellers.

8

"TM-2"

Manually-operated Motor Starter.

With thermostatic overload protection.

10 ampere—2 hp.

We manufacture a comprehensive line of Motor Starters—manually operated and magnetic—up to 25 hp.

9

PANELBOARDS

We make a complete line of all types of Panelboards.

Our Panelboard Manual gives detailed information not only on our own lines but also furnishes valuable data on Panelboards in general, which will be very helpful to all Contractors.

Check Item 9 and receive a copy.

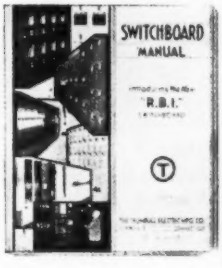
10

SWITCHBOARDS

Our Switchboard Manual introduces our modern type of dead-front boards. It outlines switchboard development from its primitive stages to the modern designs.

Replete with valuable information for contractors.

Check Item 10 and receive a copy.



11

BUSS-WA and FLEX-A-POWER

This Manual describes Buss-Wa—an enclosed busbar distribution system.

And, Flex-A-Power which is similar to Buss-Wa with heavy duty outlet plugs.

Check Item 11 and receive a copy.

12

CATALOG 16

Over 200 pages. With our various Manuals covers the most comprehensive assortment of material for complete systems of interior electrical distribution and control that the market affords.

Check Item 12 if you have no copy.

Check the items in which you are interested and mail to

THE TRUMBULL ELECTRIC MFG. CO.

PLAINVILLE, CONNECTICUT

1 ☐ 5 ☐ 9 ☐
2 ☐ 6 ☐ 10 ☐
3 ☐ 7 ☐ 11 ☐
4 ☐ 8 ☐ 12 ☐

Name _____

Company _____

Address _____

_____

REPAIR SERVICE SHOWS "NEW TYPE" PROFIT FOR APPLIANCE DEALER

Proves Key to Live Prospects

The most profitable way to discover out-of-date appliances or the need of additional ones lies in carefully checking repair department records. Service men can profitably align themselves with appliance dealers for just this purpose.

Keep In Contact with 20 Million Appliance Users

About 85% of the almost twenty million washers and cleaners which current statistics indicate to be in use are in the repair stage. While the saturation point is by no means reached, the best market for new appliance sales lies in replacing obsolete equipment or supplying the additional needs of an already demonstrated purchasing power.

Repair Service Cuts High Cost Of Cold Canvassing

Because of wear and oil soaking, motor brushes are the most frequently replaced appliance part. In fact, with a well rounded brush stock and a few other common parts, a repair man is prepared to not only solicit appliance repair work but also to sell worthwhile leads to appliance dealers.

A well rounded brush stock is offered in Ohio's new *Universal Service Kit No. 3* containing brushes, springs and oil wicks to fit over 131 makes of appliances. It is both adequate and economical in having a total of 150 brushes yet only 19 sizes.

Priced at $7.50 net, it offers a means of servicing practically any appliance regardless of make or age thus providing the necessary equipment to locate live prospects on a profitable basis.

ORDER FROM YOUR JOBBER OR MAIL COUPON

The Ohio Carbon Co., E. C.-1
12508 Berea Road,
Cleveland, Ohio.
Gentlemen:

Please send further details about your Universal Service Kit No. 3 including list of 131 nationally known makes that can be fitted.

Name _____

Address _____

City _____ State _____

L. E. Mayer

construction dwindled to virtually nothing. For six years he has continued at the head of this organization in active personal leadership through a protracted period of unparalleled difficulties due to the economic prostration of the electrical contractor.

Meanwhile the National Industrial Recovery Act placed upon him the responsibility for the development of a code of fair competition for the electrical construction industry and a workable basis for self government within that trade, whereby the many thousands of small and large contractors throughout the country might be organized in a practical cooperation. It involved the nationalization of a craft composed in large part of individuals, whose activities in the past have been purely local with little recognition of broad industry interests or obligations, as well as a definition of the scope of operations that properly belong in the field of electrical construction.

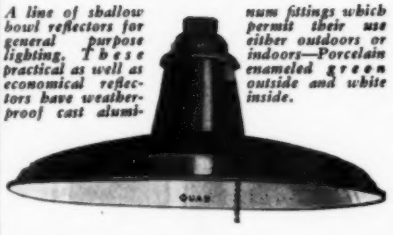
By reason of his tireless and persistent energy throughout the long drawn process of code planning and negotiation, there evolved a code that strikes at the root of the most baffling problems of the electrical contracting business and by his patience and tolerance towards the opinions of others and his unswerving devotion to the interests of the contractor, despite the serious personal sacrifice involved, he aroused the hope and inspired the loyalty of a wavering membership and marshalled a conscious national industry within his association. With this united following he has launched a program of national and local self government that promises enduring benefits for the economic security and well being of his industry. This program he is now administering as chairman of both the National Code Authority and the Regional Committee for the several states of his area.

In recognition of this constructive contribution to the advancement of the contractor-dealer branch of the electrical industry, the judges have awarded to Mr. Mayer the Contractor-Dealers Medal and Purse for 1934 given under the James H. McGraw Award.

QUAD LIGHTING UNITS

BETTER *Modernization* CALLS FOR QUAD QUICK DETACHABLE REFLECTORS

A line of shallow bowl reflectors for general purpose lighting. These practical as well as economical reflectors have weatherproof cast aluminum fittings which permit their use either outdoors or indoors—Porcelain enameled green outside and white inside.



A better modernization job can be done with QUAD Quick Detachable Reflectors. These highly efficient lighting units will not only help you land many jobs through demonstration but will be the source of much repeat business.

Go after industrial modernization work—you'll find it profitable and easy to get with QUAD Quick Detachable Reflectors.

In addition, you'll find QUAD has a line of fittings which are interchangeable and permit the use of both shallow bowl and dome reflectors shown as well as other Q D Reflectors and globe holders—Reflector sizes range from 8 to 16 inches.

Write for full data on QUAD Reflectors.

The QUAD special dome reflector when combined with three different types of socket fittings provides a wide range of applications. Strongly constructed and weatherproof. Sockets easily wired and reflectors can be quickly attached and removed without disturbing wiring.

QUADRANGLE MANUFACTURING CO.
30 So. Peoria St. - - - Chicago

USE THIS CHART TO SPECIFY THE BENJAMIN LIGHTING EQUIPMENT SUITABLE FOR THE JOB • • • •

1. For general lighting "Turnlox" R L M Dome	2. For soft, diffused lighting "Turnlox" Glassteel Diffuser	3. For lighting from the side "Turnlox" Elliptical Angle Reflector	4. For lighting high narrow bays Concentrating Type Reflector
5. For gasoline refineries and other explosive atmospheres Explosion-Proof Fixture	6. For grain elevators and other explosive dusts "Type II-G" Dust-Tight Fixture	7. For very smoky, damp and dusty locations "Vapor-Seal" Fixture	8. For locations exposed to vapors and non-combustible dust Heavy Duty Gas and Vapor-Proof Fixture
9. For locations exposed to vapors and moisture "Vapolet"	10. To keep lamps and reflectors clean Dust-Tight Glass Cover	11. For high intensity supplementary lighting. "Intensifier"	12. For sign lighting "Master" Sign Reflector

Benjamin Distributors and ample stocks are available in every part of the country—

SEND FOR NEW LIGHTING CATALOG

BENJAMIN ELECTRIC MFG. CO., Des Plaines, Illinois. *New York, Chicago, San Francisco*

BENJAMIN REFLECTORS

TRADE MARK

FLOODLIGHTS . . . PANELBOARDS . . . FITTINGS . . . SIGNALS

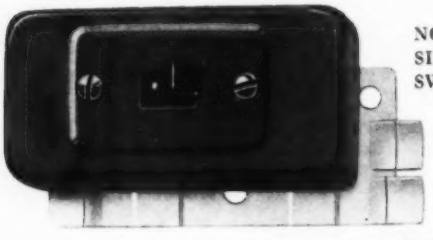
THE WIREMOLD ZONE

THERE IS A WIREMOLD ZONE OF USEFULNESS AND PROFIT IN EVERY FIELD OF WIRING PRACTICE!

NUMBER 6 OF A SERIES ON WIRING OPPORTUNITIES

SWITCH CONTROL!

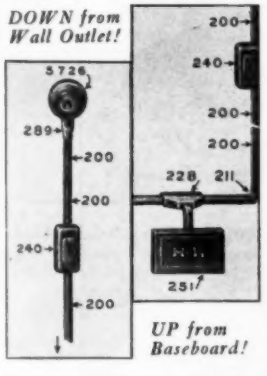
FOR ADDED OUTLETS



NO. 240
SINGLE-POLE
SWITCH

See how nicely Wiremold meets this common situation!

JUST another instance of that marvelous adaptability to all conditions and to all fields of wiring practice. That is why Wiremold has become the chief reliance of contractors who specialize in the modernization of existing wiring systems.



ABOVE — The amazing versatility of this fitting is merely a demonstration of the versatility of ALL Wiremold fittings.

243

GENERAL UTILITY OUTLET

243A

SPECIAL RADIO OUTLET

AT LEFT — These two fittings may be used in Wiremold switch-control systems. They will help to solve many other wiring problems.

THE WIREMOLD COMPANY, Hartford, Conn.

N.E.C.A. TO HOLD CONVENTION IN SEPTEMBER

At a meeting of the Executive Committee of the National Electrical Contractors Association held in Chicago on February 11 and 12, it was voted to hold its first convention since 1932 the latter part of September in Chicago. This was the first meeting of the committee since the Washington meeting in March of last year when the Code Authority was nominated and other matters preparatory to setting up a code administration were settled.

The reports showed assets of $103,712, which is an increase of almost ten thousand dollars over a year ago. The surplus stands at $49,726. The membership in January stood at 2,826, the largest in the history of the Association, and a gain of 688 during the year.

Some new plans were proposed by the membership committee for tying the National more closely into local matters through the allocation of a certain proportion of the dues to national offices, and the rest to local works. This suggestion was referred to the constitution and by-laws committee which had brought in a new form of constitution. This new form is to be studied in detail by the members of the Executive Committee and suggestions made to the constitution committee so that a draft might be

New Portland Electric Club Head— Y. C. Bressie, of the Bressie Electric Company, contractor and dealer of Portland, Ore., was installed as the new president of the Portland Electric Club on January 10. This club now has a membership of 135 and that number is going to be greatly increased this year if the plans of President Bressie are followed out.

ONE GEAR MAY LOSE A CUSTOMER

Form V W
Sangamo
Time-Switch

Electrically wound with 10 hours reserve, using small gap mechanical contacts that have proven exceptionally satisfactory for controlling sign or window lighting.

THERE is satisfaction in obtaining new customers but even more satisfaction, plus profit, in holding them. One way to hold customers is to sell them the finest equipment and apply it efficiently to your customers' needs.

The application is your job—the manufacture of the finest time-switches is our job.

It is well to remember in selecting a time-switch that it can operate only as effectively as the assembled materials permit it—One gear may lose a customer, if it is defective.

Sangamo takes pride in stating that Sangamo Time-Switches are the finest made from every standpoint.

More than 30 years of precision instrument manufacture goes into every Sangamo Time-Switch. They are electrically and mechanically as perfect as it is humanly possible to make them.

Be certain your next time-switches are Sangamos—use them to get customers and to hold them.

Sold by leading wholesalers in every distribution center.

SANGAMO ELECTRIC COMPANY

• SPRINGFIELD, ILLINOIS •

1 2 3
Actual Size
5/8" Thick
McGILL
THIN MODEL
Levolier
No. 41
6 Amp.
The Levolier Thin model Switch No. 41 is an achievement in small switches. The above actual size picture shows it is not over ⅝ of an inch in thickness. In spite of its smallness, it retains all of the practical characteristics of the famous Levolier line. It is the smallest 6 amp. switch made.
At the left are shown six logical uses for this practical Levolier, which may be secured in three different stem lengths. You'll make no mistake in ordering these Levolier Thin Model Switches.
McGILL
MANUFACTURING CO.
Electrical Specialties of Quality
ESTABLISHED 1904
VALPARAISO · INDIANA
Box No. 670

Thar's Gold In Them Thar *Mills!*

●When the residential work is slow, why not go after the commercial and industrial business? There is real money to be made in those mills and factories on the outskirts of every town in the country. Inadequate wiring, overloaded circuits, exposed contacts, badly worn insulation, make-shift extensions, leaky motors, and other antiquated electrical services are yelling for attention. Any sales-minded contractor can dig out plenty of industrial work if he'll go after it.

●And ELECTRICAL CONTRACTING tells you, each month, how to find this kind of work, how to sell it, how to bid on it, how to install it, how to comply with code requirements, how to save time, labor and materials on industrial, commercial and residential wiring and motor repair work. Don't gamble that you're methods are the best, when you can invest $2 in ELECTRICAL CONTRACTING and get the most successful wiring ideas of other electrical men. *Send in your subscription right now.*

FOR YOUR CONVENIENCE—*There is a handy subscription order card in this issue. Why not mail it in today?*

ready for approval by the time of the convention in September.

A report was made concerning the joint conferences with the manufacturers in pursuit of the policy to secure preferential discounts for contractors. It was annnounced that the association would continue to make every proper effort to secure this recognition for the contractor.

A resolution was adopted recommending the separation of contracts for the mechanical trades, from the general contracts on P.W.A. work.

Application for a charter received from the Lighting Fixtures Employers League, Inc., of New York City, with applications for membership from twenty lighting fixture contractor-dealers, was approved and a charter has been granted to this group under the Lighting Fixtures Employers Chapter (No. 6), New York City. This is the first time a non-contracting group has been recognized in N.E.C.A. membership and chapter charter.

It was voted that all new applications for membership in the N.E.C.A. must hereafter be accompanied by remittance for a full year's dues of $15.00 with the application and that applications cannot be accepted upon payment of only a portion of a year's dues. Under the revised by-laws membership of new members dates from the first day of the month within which their application for membership is accepted and their year's dues cover the twelve months period to the first of the corresponding month the following year and their annual dues will thereafter be payable on the first of such month each year.

ELECTRICAL MANUFACTURERS NEED NOT FILE BIDS

Electrical manufacturers are notified in the February 28 issue of NEMA News that having secured for electrical manufacturers a stay of application of the electrical construction code, they may engage in any phase of electrical construction work without being required to abide by any provisions of the electrical construction code. The statement of the National Electrical Manufacturers Association is as follows:

The Electrical Manufacturing Industry heretofore obtained a stay of the application to electrical manufacturers of any applicable provisions of the Supplemental

Panther & Dragon TAPES

Backed by
LONG EXPERIENCE

Panther and Dragon Friction and Rubber Tapes are outstanding among commercial tapes because they are backed by the reputation and experience of the Okonite Company, for over half a century a leader in the insulation field. This accounts for such features as longer life, greater tensile strength and adhesiveness, distinctive green cores, and for the Cellophane wrapping sealed around each roll.

Panther Counter Display. Contains 16 rolls of Panther No. 2.

Handy Package. Contains 10 rolls of Panther No. 8.

Panther Friction Tape. Nos. 8, 4, 2 and 1 in individual boxes.

Dragon Friction Tape. Nos. 8, 4, in individual boxes.

Panther Display Rack. Contains 10 pounds of Nos. 8, 4, 2 and 1 Panther Tape.

HAZARD INSULATED WIRE WORKS

Division of

THE OKONITE COMPANY

Factories: Wilkes-Barre, Pa. Passaic, N. J.

For

Residence Wiring

The Best and Safest Method is a properly installed KNOB and TUBE job. Be sure and get the

TRADE MARK Bull Dog REGISTERED

Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

Would you like a Set of These DATA SHEETS?

Covering Remote Control for Lighting Circuits

Prepared by Don Graf

They are free. Just send the coupon. These data sheets were prepared for Architects, but are invaluable for every electrical contractor.

They tell you How, When and Where to use Remote Control Switches, with wiring plans.

The makers of "Diamond H" Remote Control Switches will send it.

Send this coupon today

THE HART MFG. CO., Hartford, Conn. C.
Send the set of Data sheets on "Diamond H" Remote Control Switches.

Name .....

Firm .....

Address .....

City ..... State .....

Code of Fair Competition for the Electrical Contracting Industry.

Therefore, until such time as the stay is removed, a manufacturer operating under the Code for the Electrical Manufacturing Industry may erect, install, alter, repair, service or maintain electric wiring, devices, appliances or equipment and is not required to report his bid or deposit his bid or to pay any fee whatsoever to any other Code Authority for such work so long as the work is done by the manufacturer with his own employees or by additional employees hired and paid by him.

If the manufacturer, however, sublets the installation, etc., to an electrical contractor, the electrical contractor is not working under the provisions of the Electrical Manufacturing Industry Code.

Therefore, whenever a manufacturer operating under the Code for the Electrical Manufacturing Industry is requested to do anything in connection with the installation, etc., of his apparatus by any other Code Authority, he should advise such Code Authority that he is operating under the provisions of the Code for the Electrical Manufacturing Industry.

WORK RELIEF BILL

The N.E.C.A., in co-operation with other branches of the construction industry through membership in the Construction League of the United States, has been successful in having an amendment introduced through the senate committee on appropriations and written into the House Joint Resolution 117 (Work Relief Bill), which reads as follows:

"Wherever practicable in the planning and execution of such program full advantage should be taken of the facilities of permanent public agencies and of private enterprise."

KIRKLAND RELINQUISHES UNIFORM LEGISLATION WORK

H. B. Kirkland, for years in charge of the uniform legislation department of N.E.M.A., has been appointed assistant to the managing director of the association, W. J. Donald. R. Bourke Corcoran, who was director of the general service department, and was at one time director of the Chicago Electric Association, succeeds Mr. Kirkland in the Uniform Legislation department.

Ill health made it advisable for Mr. Kirkland to relinquish the strenuous work of directing the uniform legislation activities. Under his leadership this department was able to popularize the National Electrical Code and bring about a new understanding generally as to the proper functions of electrical ordinances.

MINERALLAC

Cable or Conduit Hanger

Jiffy Clip

Now furnished in EVERDUR as well as Cadmium Plated Steel.

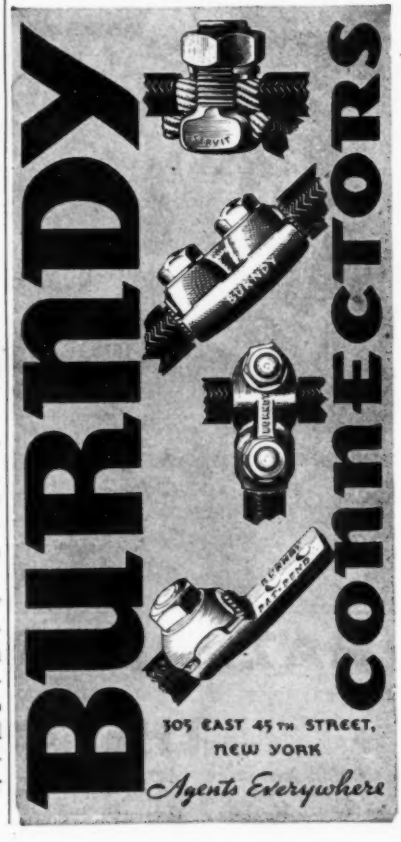
Cable or Conduit Hanger
Rigid Conduit—⅜"—2½"
Thin Wall—½"—1½"

Jiffy Clip—Rigid Conduit
⅛"—1¼". Also B X Cable

Ask your Jobber

MINERALLAC ELECTRIC CO.
25 No. Peoria Street, Chicago, Ill.

New York City Branch
381 Fourth Avenue



FOR the RADIO: — No. 2145 Radio Outlet, providing aerial, ground and power connections with all wiring concealed. For the ELECTRIC CLOCK: — No. 7707 Clock Hanger Outlet, which provides mechanical support for the clock and includes electrical connection. For the ELECTRIC FAN: — No. 7750 Fan Hanger Outlet which holds the fan and combines the electrical connection. For the ELECTRIC RANGE: — No. 7950 Range Outlet which provides for straight-in wiring, with solderless connections. Interchangeable cable clamp allows for bottom or back wiring. For OUTDOOR APPLIANCES or lighting conveniences: — No. 7792 Outdoor Receptacle, weatherproofed throughout. These devices are the hub of consumer interest and the *center of sales-emphasis* in the successful merchandising of wiring jobs. *ALL* listed in your H & H Catalog and completely described in illustrated data-sheets, on request.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD. CONN.

A. C. ELECTRIC
GENERATING PLANTS

The Sale of MODERN A. C. PLANTS brings calls for WIRING, FIXTURES, APPLIANCES, and EQUIPMENT

ONAN ALTERNATING CURRENT PLANTS operate on Gasoline, Gas or Distillate. COMPLETE, READY to RUN. Built in sizes 350 to 50,000 watts $110 and up. Supply 110 or 220 volt, 60 cycle, single or three phase current. For use where power lines are not available, for standby equipment, Public Address and Sound Car Installations.

Operate A. C. Radio Washing Machines, Water-Pumps, Refrigerators, Motors, or any equipment operated from city current can be run on ONAN A. C. PLANTS.

Battery Plants available in similar sizes.

Write for Details

D. W. ONAN & SONS
290 ROYALSTON AVE., MINNEAPOLIS, MINN.

IF According to Mr. K. A. Reed's Address before the Westinghouse Club *

84.4% OF ELECTRICAL FAILURES ARE DUE TO INSULATION HOW CAN YOU AFFORD TO BE WITHOUT A MEGOHMER?

Model "DM" Megohmer

Especially in view of the fact that, according to our customers, a Megohmer pays for itself in eight to nine months.

Model DM Megohmers are used by leaders in all industries using electrical equipment.

Herman H. Sticht & Co., 27 Park Pl., New York, N.Y.

☐ Send copy of Bulletin 170C—Model DM Megohmers
☐ Send copy of 28 page Bulletin 147C—"What Constitutes Safe Insulation."
☐ Send copy of Reprint "Insulation Protection" by K. A. Reed.*

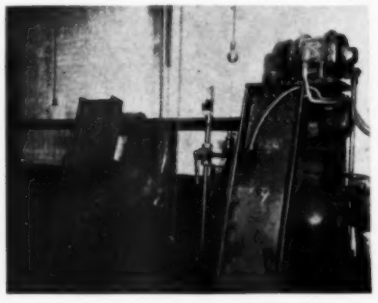
Signed .....
Position .....
Firm .....
Address .....
.....

3E.C.

PRACTICAL METHODS

HEAVY DUTY HYDRAULIC PRESS

In doing heavy equipment repairs requiring the removal of large pinions and gears a tremendous pressure is required at just the right position. The Price Electric Co., Inc., Columbus, Ohio, owns a specially designed



hydraulic press which provides 125 tons pressure upon a 10 in. diameter ram with an 18 in. long thrust. In addition to electrical repair work, such as removing special gears, pinions and commutators, large construction equipment is brought in from other shops to be placed in this mcahine, due to its upright design and 11 ft. long bed adjustment. Pressure is built up by a 2-piston pump, driven by a 5-hp. motor. A one-ton chain block is mounted above the press upon an I-beam track, thus permitting heavy objects to be swung to the desired position between the ram and the adjustable head block and frame.

RIGID MOTOR PLATFORM

Motor platforms that permit the alignment of large motors with existing overhead shafting for 50-h.p. short center V-belt drives were provided for a battery of paint manufacturing machinery during a recent change-over from steam engine to motor drives.

A sturdy structural steel framework was erected, equipped with cross timbers for bolting the motor base in position. These platforms provide clear headroom on the working floor beneath, permit exact horizontal pulley planes, avoid excessive dust accumulation, and leave the drives easily accessible for adjustment and

MULTI

REFLECTORS

Modernization work in industrials will call for new and efficient lighting. "MULTI" Steel Reflectors—they give lighting efficiency—they do not rust, chip or crack. Porcelain enameled white inside, green outside. Made in all standard types and sizes.

You'll profit by installing "MULTI" Reflectors on all your new as well as modernization work.

2-PIECE DOME REFLECTORS

The new "MULTI" 2-piece dome industrial fixture has a white diffusing glass globe with an all white reflector. The glass globe is held by a "MULTI" "Gripit" holder with internal finger support. No possible breakage from vibration or expansion.

Send for our complete catalogue of Multi Products.

MULTI ELECTRICAL MFG. CO.
1840 W. 14th St. CHICAGO, ILL.

SHERMAN

TINNED SPLICING SLEEVES (SPLIT CONNECTORS)

• Correctly designed — accurately made of purest copper.

These Sleeves can be used on round or sector shaped cable and are so designed that when properly soldered, the wire will break before loosening in the sleeve.

Tests made on Sherman Sleeves have proved that they have no tendency to overheat.

Sold by Jobbers
Write for Trade Bulletin No. 20

H. B. SHERMAN MFG. CO.
BATTLE CREEK MICHIGAN

CONTRACTORS » »

DO YOU KNOW

Mr. I. GUESS?

HE'S the Contractor who prefers to keep on losing money because he did not know the price had changed!

He admits that these are days of constantly changing prices, when every guess on prices is a bad guess—*a probable source of loss*, yet he goes merrily on. In the meantime, the sheriff is just around the corner.

Every Contractor has general information on prices, but when you come to billing materials, you naturally want *concrete, specific* information on what to charge and why.

Hundreds of successful Contractors and Dealers in every part of the country rely upon the NATIONAL RESALE PRICE SERVICE as their first assistant for just such definite price information, whether it be a socket bushing or a 400-ampere safety switch. Its use will give you confidence by supplying physical support for your pricing.

Don't miss the profit possibilities of this unusual Service until you have investigated. The coupon attached to your letterhead will bring you complete details without cost or obligation.

Henderson-Hazel Corporation
5005 Euclid Ave., Cleveland, Ohio

Gentlemen:

Without obligation please send us full particulars about the NATIONAL RESALE PRICE SERVICE.

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E. C. 3-35

HENDERSON-HAZEL CORPORATION

5005 EUCLID AVENUE CLEVELAND, OHIO

Don't miss the chance to

make extra money

selling RCA Victor Sound Systems!

Every month is seeing more RCA Victor Sound Systems sold! Schools, hotels, and public buildings of all kinds are feeling the need of good sound systems!

You, more than anyone else, are in contact with the people who need sound systems. The prestige of the RCA Victor name alone will help you make a sale.

AND YOU MAKE MONEY NOT ONLY ON THE EQUIPMENT — BUT ON THE INSTALLATION AS WELL!

More work for your men — more income for you!

We gladly offer technical advice and detail drawings for sound systems. Write us, Dept. EC, Camden, New Jersey.

Every Kind of Sound System

SOUND AMPLIFICATION SYSTEMS
PUBLIC ADDRESS SYSTEMS
SOUND PICTURE EQUIPMENT
PAGING AND ANNOUNCEMENT SYSTEMS

RCA VICTOR
Commercial Sound Systems

RCA Manufacturing Co., Inc.
Camden, N. J.

A Radio Corporation of America Subsidiary

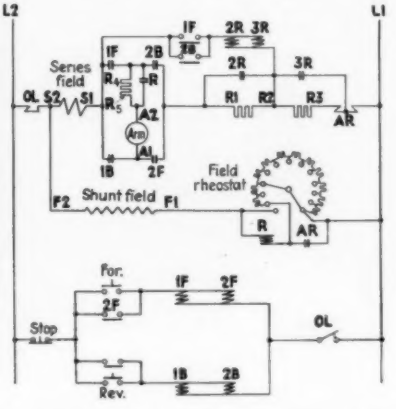
maintenance. The design accommodated back-to-back motor mountings for two drives from one platform, thus simplifying the sectionalizing of the existing main shaft. Main supports are 10-in. "I" beams, bolted by means of right-angle shoes to the existing round columns. Two 8-in.

parallel channels which rest upon these supports are provided with 3-in. angle iron shoes for the attachment of 4-in. by 6-in. motor base timbers. Overhead obstruction required the 50-h.p. motor in the background to be set 2 in. lower than the front motor. This was easily accomplished by lowering the 3-in. angle shoes when bolting them to the inner faces of the parallel channels. Since these platforms were not supported from the wooden ceiling timbers, the quiet vibrationless drive which resulted is proven by the accompanying photograph, which was exposed 25 seconds with both motors in operation. This work was installed by Louis Kalischer, Inc., Brooklyn, N. Y.

FIXED SLOW SPEED ARMATURE RESISTOR

By J. M. NEWMAN
Electrical Engineer, Cutler-Hammer, Inc.

A simple method was recently devised for providing a fixed slow speed through the introduction of an armature series resistor with the control equipment for a 5 h.p. 230-volt, 575/1150 R.P.M. motor operating the table reversing drive of a sheet polishing machine. This fixed slow speed was necessary whenever the field rheostat was moved to the full field position. The operating coil of the contactor "R" commutating this series resistor "R4-R5" was therefore designed and connected into the circuit as the first step of the field rheostat. With the rheostat in the full field position, the "R" contactor coil was deenergized and the series resistor "R4-R5" inserted in series with the motor armature. In combination with the full field starting relay "AR," the rheostat in any other than the full field position would pick up and maintain the "R" contactor closed, thereby shorting out the slow speed series resistor "R4-R5" and



connecting the armature across the line. The combination of contactor and coil were designed to hold in on minimum field current. The use of this scheme and modifications of it are apparent for off position interlocks and similar schemes of control.

HANDLING LEAD SHEATHED CABLES

Considerable cable pulling and make-ready time can often be saved if such operations can be completed before working spaces become crowded with machinery or other equipment. In wiring an addition to a Cleveland automobile body factory,

No transient ideal is the Memorial Auditorium in Worcester, Massachusetts—but a structure of enduring beauty—built to pay homage to that city's honored heroes—who, in time of national stress, made the supreme sacrifice.

THAT *Memory* MIGHT ENDURE

In building this great tribute to memory only the finest of craftsmanship and the best of materials were utilized. The utmost care was taken to assure perfection throughout and a most important detail was the insurance of the integrity and permanence of electrical equipment and circuits. To make certain of this—**Amparak (intermediate performance grade) Electrical Wires and Cables**—quality products of the **American Steel & Wire Company** were specified. We are proud of the confidence thus bestowed upon us—just as we are proud of the unequalled record of service and performance that our Electrical Wires and Cables have established in every field of usage. We invite you to correspond with us—to take full advantage of the technical facilities maintained to serve you.

ELECTRICAL WIRES and CABLES
MADE BY

AMERICAN STEEL & WIRE COMPANY

208 SOUTH LA SALLE STREET • • CHICAGO

Offices in All Principal Cities

United States Steel Corporation Subsidiary

IDEAL

Wires Ready for Insertion

Completed Joint

NEW— LOW PRICED

THE NEW IDEAL NO. 73 JUNIOR UNIVERSAL CONNECTOR

The *New* No. 73 Ideal Connector is a smaller size and lower priced Ideal "Thread-On" Connector. It makes all common wiring joints—2 No. 14, 1 No. 14 and 1 No. 18, etc., solid or stranded, up to a maximum of 2 No. 14 and 2 No. 18 or 4 No. 16 or 5 No. 18 awg Wires, or equal combination, and is *especially* adapted to fit cramped quarters—fixture wiring, signs, shallow canopies, etc. It's built to fit where regular size connectors can't be used.

Just screw it on like a nut on a bolt and you have a stronger mechanical and better electrical joint at a low cost. Send for a sample.

Approved by Underwriters' and Factory Mutual Laboratories. Recommended by National Electric Code.

Ideal Commutator Dresser Co.
1041 Park Ave. Sycamore, Ill.

Ideal Commutator Dresser Co.,
1041 Park Ave., Sycamore, Ill.
Please send a sample of the Ideal No. 73 Connector. Ill give it a fair test.

Name .....

Address .....

City ..... State.....

the Hatfield Electric Company of that city had thirty-six 4/0 lead sheathed cables to install in a bank of fibre conduits, between a main distribution center and various load centers. Since a maze of heavy equipment was scheduled to be distributed and assembled about the new building as soon as the concrete had become sufficiently cured to withstand such abuse, it was decided to take advantage of clear working spaces for cable pulling while still available.

Each set of feeders was installed with a sufficient length at the switchboard room to provide a continuous unspliced conductor to its lug connection. Since the switchboard was to be located in a separate room, isolated from interference or injury from the moving or assembling of plant equipment, the extra conductor lengths were laid out along the concrete floor with a minimum kinking of lead sheath. Upon the erection of the switchboard, a sectional raceway for enclosing these conductors will permit their being laid in place to the point where lug connections occur.

CONDUIT SUPPORTS IN CROWDED SPACES

A simple strap for fastening conduit upon cross members in places where there is no space available for drilling or punching a vertical hole, may be formed out of $\frac{1}{8}$ in. by $\frac{1}{2}$ in.

soft iron to fit the size of conduit used. The strap ends are drilled before forming for bolting to the vertical face of the cross member. If there is considerable vibration, the nuts should be equipped with lock washers. The illustration is a run of $\frac{3}{4}$-in. conduit beneath a rigging platform in a theatre job which was installed by the E-J Electrical Installation Company, New York City.

INDUSTRIAL SIGNA-KALL

SIGNA-KALL

New, dependable, simple, give signals in code. Has 30 separate codes. Will call any of 30 different people. Repeats calls 3 times. Set dial once only. Locate at switchboard. Will operate any type signal, horn or siren.

Ask for specifications.

FEDERAL ELECTRIC COMPANY
8726 So. State St., Chicago

Sell ELECTRIC CURRENT AT LESS THAN CITY RATES

● There's big sales opportunity among homes and small manufacturing companies for Universal Electric Plants. Light, power, and emergency units supply current at lowest cost ever. Cash in on this waiting market in your territory with the Universal line; all types and models from 330 watts to 50 KW. There are more than 2,000 Universals in U. S. Gov't service on land, sea, and air. Write today for details.

ASK FOR CATALOG E-1

Send for Catalog

UNIVERSAL MOTOR CO. OSHKOSH WIS.

BETTER SOLDERING LUGS

Wolverine Lugs are made from the best electrolytic copper of high conductivity and are processed under the complete control of Wolverine Engineers.

The Square End Design offers greater contact area and increases the current carrying capacity of the lug.

For greater safety use Wolverine Lugs.

WOLVERINE TUBE COMPANY
1441 Central Ave. Detroit, Mich.
STOCKS IN ALL PRINCIPAL CITIES

Manufacturers News

NATIONAL ELECTRIC PRODUCTS SOLD TO ROBINSON

The recent sale of the National Electric Products Corp., Pittsburgh, Pa., a subsidiary of the Phelps-Dodge Corp., to W. C. Robinson and associates of Pittsburgh has been confirmed to the press. It was found that conduit and allied steel products did not fit in with the copper producing business. The Phelps-Dodge Corp., which is one of the world's largest copper producers, has retained the subsidiary corporation which is a consolidation of several companies, among which are Habirshaw Cable and Wire Corp. and Inca Mfg. Co.

NEW NAME FOR SIGNAL LINE

Signal Engineering and Mfg. Co., New York, N. Y., has just released its new 12-page catalog D, which illustrates and describes the Wheelock line of signaling, fire alarm and relay apparatus. This new name for Signal products identifies J. H. Wheelock, founder of the company more than twenty-five years ago.

MOE-BRIDGES RE-ORGANIZATION

The Moe-Bridges Corp., with headquarters and plant at Milwaukee, Wis., has been organized to take over the manufacturing of electric lighting fixtures of the original Moe-Bridges Co. The Electric Spraylit Co. of South Bend, Ind., has also been merged with the new company in the Milwaukee factory. S. Deutsch, president of the Electric Spraylit Co., is president of the new Moe-Bridges Corp.

Graybar Electric Company, New York, announces the appointment of M. L. Wilkins as manager of its office at 222—9th Street, Oakland, Calif. Mr. Wilkins has been connected with the Oakland office of the Western Electric Company since 1923.

General Cable Corp. announces a change of Cleveland address from 504 Terminal Tower Building to 2637 Superior Avenue.

E. H. Clark, formerly St. Louis manager for the Rockbestos Products Corp., and for 11 years with the Northwestern Power and Light Co., has joined the Harnischfeger Corp., Milwaukee, Wis., as its representative in the middle west and southwest territory.

LUMINOUS TUBE FOOTAGE INDICATOR

A vest pocket luminous tube footage calculator has just been put out for neon sign builders and contractors by the Jefferson Electric Co., Bellwood, Ill. This chart has a slide which gives the exact figures in feet for the various secondary voltages through a slot in the pocket part of the calculator. No figuring or other reference is claimed to be required. A rating chart for all 110-volt 60-cycle primary transformers is also included in this compact device.

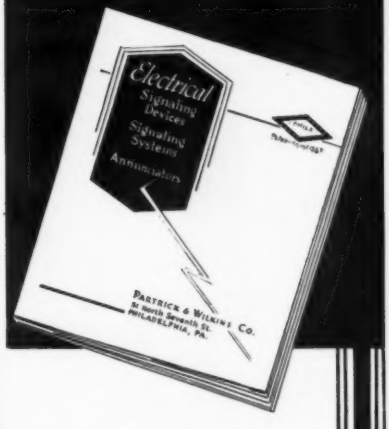
The Simplet Electric Co., New York, N. Y., announces the appointment of the P. M. Day Co., Detroit, Mich., to represent it in the State of Michigan, and of L. F. Stahl, Indianapolis, Ind., as its Indiana representative.

S. T. Rodgers, 3351 Norwood Road, Cleveland, Ohio, recently announced his connection with the Impervious Varnish Company of Pittsburgh, Penna. Mr. Rodgers will handle sales in the Cleveland territory and cooperate with the research department in the development of new products in the insulating market field.

Signal Electric Manufacturing Co., Menominee, Mich., announces the appointment of H. R. Hopkins Co., 95 Fairmount Ave., Philadelphia, Pa., as direct factory representative for that territory.

The Royal Metal Box Corporation, manufacturer of standard and special metal enclosures, panelboards and switchboards, has been established in Brooklyn, N. Y., to operate in con-

NEW DATA ON SIGNALING



Just off the press!

More than just "another catalog," Partrick & Wilkins offer a real data book, cram full of helpful information and showing the complete P. & W. line of signaling systems and devices. This book will be of genuine assistance in modernization work, as it gives particular emphasis to new equipment and its application. Every device shown is backed by years of experience and an international reputation for quality and fair dealing.

Send for this data book today. It is free and incurs no obligation. The coupon below is for your convenience.

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Send your new catalog to
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Street .....
City ..... State .....
Please check below for future mailings
☐ CONTRACTOR ☐ WHOLESALERS ☐ INDUSTRIAL PLANT

March New Products

Portable Public Address

A portable public address system PG-62-B has been announced by RCA Victor Co., Inc., Camden, N. J., composed of a velocity microphone, two loudspeakers, an amplifier, and a portable motor-driven phonograph unit. The microphone is claimed to transmit with high efficiency, naturalness and distinction of ton, with high directional characteristics devoid of audience hum or

other extraneous noises. A 30 ft. rubber cord and plug is supplied together with an extension tubing for lengthening the microphone stand. Two electro-dynamic type loudspeakers are included in a black leatherette carrying case, which is 22 in. long, 15 in. high and 11 in. deep, weighing with two speakers 55 lbs. The speakers are claimed to be capable of 20-watts maximum output for satisfactory operation in halls up to 2500 capacity.

Hazardous Location Enclosure

The Allen-Bradley Co., Milwaukee, Wis., has announced a line of type D, dust-tight enclosures for solenoid-operated switches used in Class 2, Group G hazardous loca-

tions, such as flour mills, pulverized fuel plants, etc. This design is available for Allen-Bradley No. 709 starters in polyphase ratings up to 15 hp., 110 volts; 30 hp., 220 volts; and 50 hp., 440-550 volts; also single-phase motors of the self-starting type. The enclosure is of cast iron having a machined surface between the cover and base which is claimed to make a seal without the use of gaskets. The top and bottom of the base are tapped for conduit. An externally operable thermal relay reset button is provided on the cover of this enclosure. The exterior finish is black enamel while the interior is white enamel.

Twin All-Rubber Cord

A recent development, "Siamese" twin all-rubber cord, is announced by the Essex Wire Corporation, Detroit, Mich. It is claimed to provide easy attachment to a lamp or an appliance. By a special construction feature, the ends of a cord may be split in the center at a groove, which permits ripping this cord back easily. Ease of stripping the ends is presented as a distinct improvement for making connections. Despite the ease of ripping the cord ends apart, it is claimed that no bindings or tieings are necessary after connections have been made.

Alcohol Torch

A self-generating "Blue Blast" alcohol torch claimed to produce a flame of 2100 deg. F. is announced by Scovill Manufacturing Co., Waterbury, Conn. Denatured alcohol is recommended. The torch is filled from the top by unscrewing the burner

head. A primary cup containing saturated asbestos is lighted, this heat causing the torch to start burning automatically and is claimed to burn for one hour when two-thirds full.

Safety Switch

A compact toggle type front operated switch has been announced by the Bull Dog Electric Products Co., Detroit, Mich., which is known as the NID line. A snap-action switch mechanism has been developed

which involves the use of a flat steel actuating spring. Frictionless, knife-edge pivots are claimed to preclude wear.

Automatic Water Pump

Decatur Pump Co., Decatur, Ill., announce the "Niagarette" water system, for providing automatic water supply to small homes, summer cottages, road stands, fill-

ing stations, etc., from wells or cisterns. Designed for use where the water supply is within 28 ft. vertical distance to the pump, this system is available in 200 and 300-gallon-per-hour capacities, employing ½ h.p. and ¾ h.p. induction-repulsion type motors. The turbine principal in pump design is claimed to provide smooth, non-pulsating water flow, coupled with simplicity, there being no belts, pulleys or gears. The lack of exposed moving parts, it is claimed, permits this pump to be installed with safety in any room without danger of injury to children.

Forged Clamp Lugs

The Qiklug line of solderless clamp type wire and cable lugs for conductor sizes up to and including 500,000 c.m., is announced

by Burndy Engineering Co., New York, N. Y. Features claimed for this line are quick installation, ability to withstand severe overloads without contact heating, secure pressure under vibration, and ease of disconnection from temporary installation with full cable salvage. These lugs are made by a forging process which is claimed to provide greater strength and conductivity. The cable clamp is claimed to eliminate the barrel effect.

junction with the Royal Switchboard Company of Manhattan. Samuel Halper, formerly of the Star Metal Box Company, is associated with the Royal Metal Box Corporation.

Graybar Electric Co. announces the appointment of R. D. Paine as service manager of the Cleveland, Ohio, office; also the appointment of E. Black as service manager of the Detroit, Mich., office.

A 16-page illustrated manual has been released by the Trumbull Electric Manufacturing Co., Plainville, Conn., describing "Controlite" stage and auditorium lighting control switchboards. A generous arrangement of general information and typical layouts is provided, together with a glossary of stage lighting terms.

Bulletin P 72, a two-color folder describing relays, timing devices, electric counters, thermostats, electric pots and ladles has been issued by Struthers Dunn, Inc., Philadelphia, Pa. This information is supplemented with a description of the engineering services which this company is prepared to render.

Bulletin HM1 describing the details of constructions and operation of P and H convertible open squirrel cage motors has just been released by the Harnischfeger Corp., Milwaukee, Wis.

The Steelduct Co., Youngstown, Ohio, has issued a new "price-book size," catalog showing its line of conduit. Weights and diameters of conduit, elbows and metallic tubing are given together with illustrations of Steelduct hot-dip galvanized, electro galvanized, thread-protected enameled conduit, also Steelduct electrical metallic tubing.

Western Electric Company announces the release of a 20-page descriptive booklet covering marine radio telephone equipment and radio compass. This is claimed to represent a new development in the field of communication and is, therefore, treated with a detailed descriptive text and photographic reproductions of the various equipment units employed in coastal communications from fishing vessels, harbor craft and yachts.

TORK TIMERS

OFFER YOU

MULTIPLE and REPEATING OPERATIONS of WIDE FLEXIBILITY and USEFULNESS

For A.C. Only—50 or 60 Cycles

***for* STANDARDIZATION • ECONOMY • EXPERIMENTAL**

Synchronous Motor Driven Tork Timers are difficult to catalogue.

Varieties include models which close electrical circuits for one minute every hour to those which close circuits for only five seconds every five minutes.

5 and 20 Ampere Capacities, Single or Double Pole.

DID WE SAY VARIETY? ***Some recent ones:***

Testing Purity of Copper.
Bacteriological Cultures.
Cocoanut Shredding.
Life Tests, Alloy Resistance.
Mausoleum Chimes.
Sewage Disposal.
Agitation, Ceramic Mixing Vats.
Standardization of Radio Tubes.
Coal Stokers.
Bacon Curing.
Ringing Factory Sirens.
Trap Shooting.
Controlling Time Recorders.
Macaroni Drying.
Bakelite Curing.
Broadcasting.

Ask us how to handle your problem.

THE TORK CLOCK COMPANY, INC.
MOUNT VERNON, NEW YORK

OPPORTUNITY *for* DEALERS

LINK-BELT makes available to dealers in certain territories a business opportunity such as has not been possible in a long time.

The market is at about 1% of saturation. All owners of heating or process steam plants up to 300-H.P. are prospects. With the larger jobs the fuel savings exceed the payments on the equipment.

The line is automatic underfeed stokers, in 13 sizes, built and backed by a large old-established company, in business for 60 years.

Link-Belt finances deferred payment contracts for dealers, under a very attractive plan.

Advertising material, sales and engineering assistance given, plus cooperation on local advertising. Traveling representatives help you train men, close sales and survey jobs. Send the coupon for the complete story.

LINK-BELT COMPANY
STOKER DIVISION
2410 W. 18th St. Chicago, Illinois
Send stoker book 1419 to:

Name.....
Firm.....
Address..... City..... State.....

Elec. Cont. 5215

March New Products

Pipe Tools

An all steel pipe reamer with a capacity of ⅜ in. to 2 in. pipe is announced by the Toledo Pipe Threading Machine Co., Toledo, Ohio. A multiple tooth reamer head of special heat-treated steel is combined with a natural hand grip and tubular steel handle to operate like a ratchet. The reamer head may be reground or any part can be replaced. It is claimed to cut rapidly and feed easily.

Toledo super-model No. 999 power-drive pipe machine which cuts off 2 in. conduit in 14 seconds and threads 2 in. conduit in 15 seconds is also announced. This machine is designed for ½ in. to 2 in. conduit and can be used on a bench or upon a steel stand with or without wheels.

Industrial Receptacle

Type "CP" dead-end circuit breaking plugs, and type "QEE" heavy duty receptacles and fittings are announced for the Unilet line by Appleton Electric Co., Chi-

cago, Ill. These devices are recommended for use in industrial plants where precautions against exposure of the operator to live parts and grounded objects are desired. The plug design prevents circuit closure until after the plug is inserted and turned to right, thus confining contact arcs to a combustion chamber in closing or breaking a heavy duty circuit.

Wilson "Color-Glow" Boxlight

This universal boxlight manufactured by Wilson Lighting, Inc., Chicago, Ill., is designed to give high intensity illumination. It is primarily used to show window lighting where the appearance of the lighting equipment is an important factor. The unit consists of a metal box which contains three reflectors adapted for use of 100 or 150 watt lamps. Metal louvres conceal the reflectors and are painted an amber color. The louvres are so arranged and illuminated that when viewed from a distance they produce an optical illusion and appear to be panels of amber glass. This unit may be mounted at the ceiling or, in large show windows, it may be set on the floor and used as a corner light. These units may also be joined for producing a continuous lighting strip. Size 28½ in. long x 9¾ in. wide x 7 in. high.

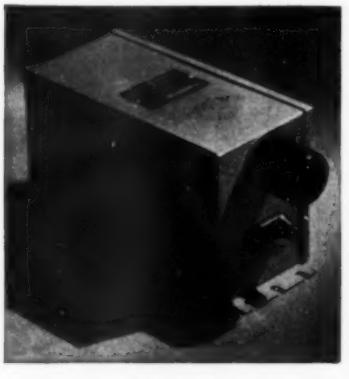
Show Window Reflector

A 200 watt prismatic reflector, No. 916, has been announced by Holophane, Inc., New York City, designed especially for flush mounting in false ceilings of show windows. Greater efficiency is claimed through an intricate arrange-

ment of reflecting and refracting prisms, together with durability and permanency. The bottom flange of this reflector unit is circular, thus requiring no irregular shaped hole to be cut when flush mounting is employed. Mounting rings are available for ply wood ceilings or with finishing and plaster rings for plaster ceilings. Various types of holders are available which permit the unit to be mounted on grooved porcelain socket, ½-in. pipe, or outlet box.

Sign Transformer

A luminous-tube transformer in 12,000 and 15,000-volt ratings, which is claimed to effect space saving, lower installation



cost, greater continuity of service, and increased operating safety, is announced by the General Electric Co., Schenectady, N. Y. Ease and safety of connection have been provided by the use of porcelain terminal receptacles and removable solderless connector plugs. If desired a length of GT lacquered cable is provided already attached to the connector plugs.

Toggle Safety Switch

The Bulletin 4140 30-amp. fusible safety toggle switch announced by Cutler-

Hammer, Inc., Milwaukee, Wis., employs an enclosure 3½ in. by 5½ in. by 3½ in. Simplified installation and ample wiring space are claimed by providing for the complete removal of the switch mechanism by loosening two screws. A front operated, double pole, positive make and break toggle switch is used, equipped with an arc resisting, laminated horn fibre operating lever, with provisions for padlocking in either the open or closed position. The enclosure is black enameled, with cadmium trim, and has top, bottom, side and rear knockouts. This line is offered as being adaptable to oil burners, domestic stokers, electric unit heaters, and as entrance switches.

Loud Speaker System

A one-way message or order system for use in conveying orders from one or several microphones at remote points to a central speaker-amplifier has been developed by the S. H. Couch Co., Inc., North Quincy, Mass.,

and is known as "Ord-O-Pam." Principal suggested uses are for giving orders to the kitchens of restaurants; messages from several executives to a central office or reception room; in public garages, warehouses, stockrooms, markets and stores. A speaker-amplifier in a black crystalline finished all-steel case is supplied with flexible 6 ft. cord and plug, also a signal-back pear type push button attached to flexible cord. Three models are available: 110-volt a.c., 110-volt d.c., and 110-volt universal. All models employ three tubes of varied types for their respective current. Desk, handset and wall type microphones are available, all employing a "press to talk" circuit switch.

Bulletin No. 500—"Industrial Lighting," describing the Cooper Hewitt mercury vapor light, has just been announced by the General Electric Vapor Lamp Co., Hoboken, N. J. A complete explanation of this industrial lighting method is given, together with illustrations, specifications, and engineering information.

The Emerson Electric Mfg. Co., St. Louis, Mo., has released its 1935 fan catalog X429, comprising 24 pages. The complete Emerson line of desk, ceiling, pedestal and ventilating fans, which includes five new units, is handsomely illustrated and described. A supplementary folder which points out these new units includes also a description of dealer advertising material which is available for the 1935 fan season.

Bulletin GEA-1358A, "G-E Control and Signal Transformers," has been released by the General Electric Co., Schenectady, N. Y. This bulletin describes various industrial and household equipment applications for transformers supplying 24 volts or less.

The Federal Steel Products Co., Newark, N. J., has been recently reorganized and is now known as the Federal Electric Products Co., a name more descriptive of its affiliation with the electrical industry.

The Appleton Electric Co., Chicago, Ill., has released bulletin 1010 which lists a line of dead-end circuit breaking plugs and receptacles in various types and sizes ranging from 15-amp. to 60-amp., in 2, 3, and 4-wire.

A 12-page bulletin entitled "Weston Relays" is now being distributed by Weston Electrical Instrument Corporation, Newark, N. J. Comprehensive lines of sensitive, toggle, polarized, power and time delay relays are described.

Herman H. Sticht & Co., New York, N. Y., has just released a 24-page bulletin No. 147 entitled "What Constitutes Safe Insulation." This bulletin contains interesting information and charts relative to standard and suggested insulation resistance values for electrical equipment, also extracts from discussions and papers by authorities on this subject.

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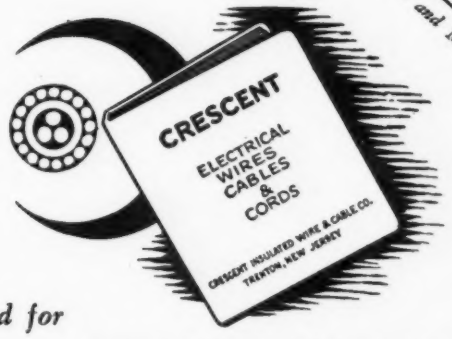

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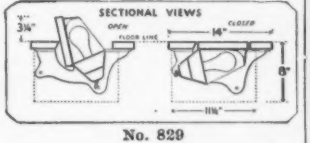

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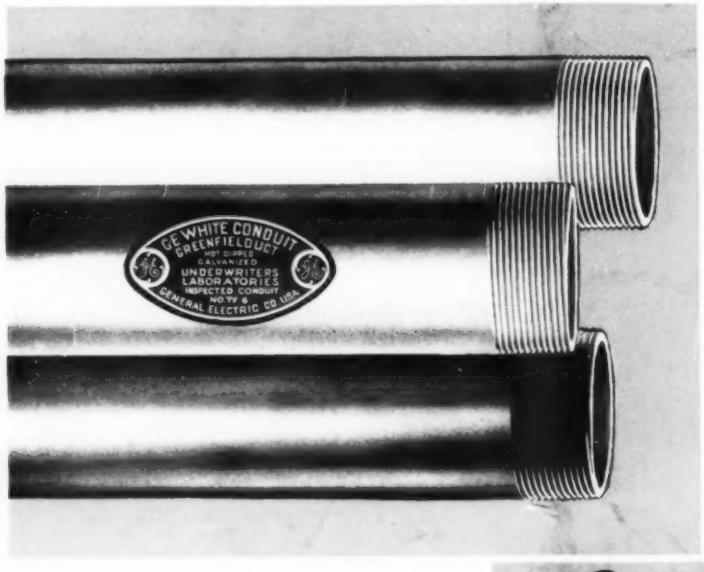

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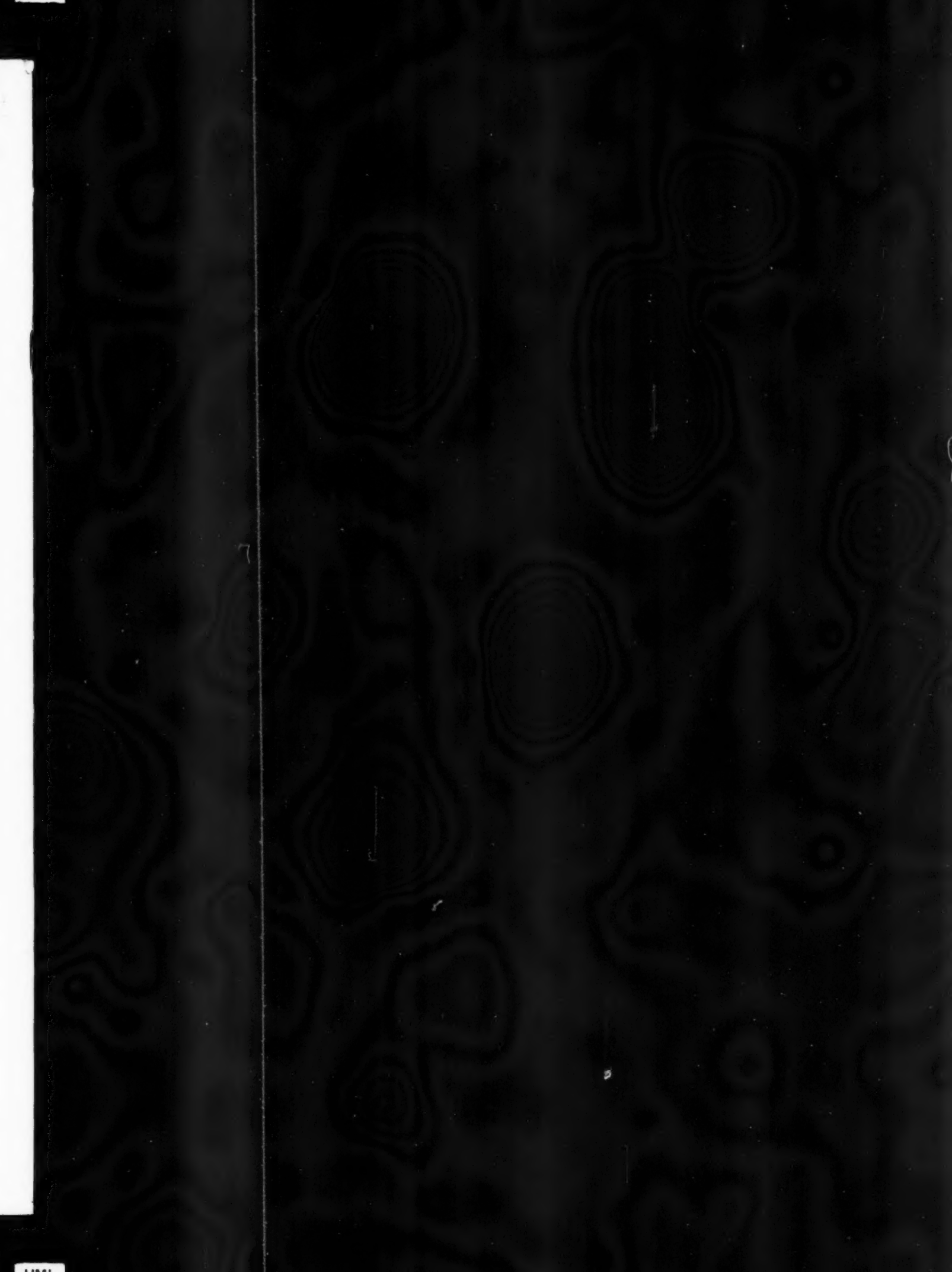
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